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TREATISES

ON

PRINTING

AND

TYPE-FOUNDING;

BY

T. C. HANSARD.

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PRELIMINARY NOTICE.

In presenting to the public in a separate form the Treatises on Printing and Type-Founding, with other branches of art connected with these processes, contributed to the Encyclopædia Britannica by Mr T. C. Hansard, the Publishers have judged it expedient to include the kindred subject of Lithographic Printing, contributed to the same work by Mr William Nichol; and they trust that the information contained in this Volume, on the various branches of art so essential to the promotion of literature, will prove at once useful to the author and the printer, and interesting to the general reader.

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TREATISE

ON

PRINTING.

PRINTING is the art of taking one or more impressions from the same surface, whereby characters and signs, cast, engraven, drawn, or otherwise represented thereon, are caused to present their reverse images upon paper, vellum, parchment, linen, and other substances, in pigments of various hues, or by means of chemical combinations, of which the components are contained on or within the surface from which the impression is taken, or in the fabric of the thing impressed, or in both.

The most important branch of printing is what is called *letter-press* printing, or the method of taking impressions from letters and other characters *cast* in relief upon separate pieces of metal, and therefore capable of indefinite combination. The impressions are taken either by superficial or surface pressure, as in the common printing press, or by lineal or cylindrical pressure, as in the printing machine

and roller-press. The pigments or inks, of whatever colour, are always upon the surface of the types; and the substances which may be impressed are various. Wood-cuts and other engravings *in relief* are also printed in this manner.

Copperplate printing is the reverse of the above, the characters being *engraven* in intaglio, and the pigments or inks contained within the lines of the engravings, and not upon the surface of the plate. The impressions are always taken by lineal or cylindrical pressure; the substances to be impressed, however, are more limited. All engravings in intaglio, on whatever material, are printed by this method.

Lithographic printing is from the surface of certain porous stones, upon which characters are *drawn* with peculiar pencils. The surface of the stone being wetted, the chemical colouring compound adheres to the drawing, and refuses the stone. The impression is taken by a scraper, that rubs violently upon the back of the substances impressed, which are fewer still in number. Drawings upon zinc and other materials are printed by this process. (See LITHOGRAPHY.)

Cotton and calico printing is from surfaces engraven either in relief or in intaglio. The chemical compounds are either on or within the characters, as pigments or chemical colours, or in the fabric to be printed, but mostly in both; the combination of chemical substances producing colour when the fabric and the engraving are brought into contact. The impression is either superficial or lineal, but mostly lineal. (See DYEING.)

LETTER-PRESS PRINTING.

The origin and history of an art which has exercised such an influence on civilization, and contributed in so essential a manner to the cultivation of the human intellect, have naturally become a matter of inquiry amongst the learned, and have almost as naturally been the source of earnest controversy; for there are few effects of human invention or industry that have been originated and brought to perfection at a particular epoch, without any previous train of thought or circumstance, so that the precise day or year could be noted in which the perfect Minerva started forth in full maturity. On the contrary, it is difficult to say at what period of time the germ of the art of printing did not exist. So obvious is the reproduction of similar appearances from an impression of the same surface, that the most early of mankind must have noted it; and even the impression of a foot or a hand must have suggested a simple and intelligible mode of conveying an idea, before the invention of any kind of writing. Accordingly, these and similar signs are found to compose the chief characters of the earliest writing, which is the symbolic.

Observing this general law of the gradual perfectibility of human arts, we must look back to the most remote ages for the first steps of that of printing. We shall accordingly

find certain evidence, that, more than two thousand years before our era, a method of multiplying impressions, rude and imperfect in the extreme, was certainly practised; but although the general fact is universally allowed, it is extremely difficult to give satisfactory examples. Turning, however, to Egypt, we shall find such traces as sufficiently prove the truth of the general statement.

The ingenuity of mankind had for a long period confined itself principally to the more easy and beautiful art of colouring surfaces with pigments, in the imitation of surrounding objects; and had their desires been limited to the production of a single essay, they would have made no deviation from an art so beautiful, and so susceptible of taste and variety. But when the wants and conveniences of an advanced state of society required effects of a more lasting character, less costly, and of more general application, a method of producing the same, or nearly the same effect, with considerable rapidity, very soon presented itself; and the sacred inscriptions at first painted or engraved upon the figures of the deities, and possibly upon articles of domestic use, were impressed upon plastic models with equal ease and certainty.

Babylon presents us with some remarkable specimens of the progress of this art, which may be received as the earliest instances of *imprinting*, the epoch of which can be in any degree approximated. These are found on the bricks many of which have been discovered on the site of the departed city. That the Assyrians should have thought it worth while to print inscriptions upon materials destined to be built into their dwellings (and every *kiln-burned* brick amongst these vast ruins is stamped with an inscription), argues that the process was not only not an uncommon one,

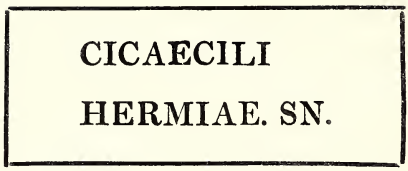
but also that there probably existed at the same time a more advanced and more elegant usage of imprinting in their domestic and ornamental arts. Specimens of these bricks may be seen in the library of Trinity College, Cambridge, in the British Museum, in the library of the East India Company, and in several private collections. Those at Cambridge are parallelopipeds of thirteen inches in length by three in thickness, and are made of clay mixed with reeds, and burned in the kiln. On one of the large surfaces is an indentation, produced by the forcible impression of a stamp, from the face of which a large portion has been cut away, leaving a series of figures in relief. The depression produced by this stamp is six inches and one eighth by three and five eighths in extent, and about three eighths of an inch in depth. It is exceedingly rude in execution, bearing a strong resemblance to the impressions of the names of the makers to be found upon the backs of inferior earthen-ware; and is produced by exactly the same means, the process of baking entirely destroying whatever sharpness the soft mass may have had. The inscription is clearly stamped in after the clay has been turned out of the mould, and is not produced by any part of it; for in all known specimens it is placed in different positions, and never stands parallel to the edges of the brick, being in fact put on more or less awry, according to the care and manual skill of the workman. The surface of the brick around the depression is forced up considerably, which is exactly the effect of pressing the hand or any substance into a plastic material; and the edges both of the parent depression and of the figures present the effect of the stamp having been drawn up whilst the clay was still damp and adherent to it. The inscription consists of six vertical columns, containing thirty-

eight figures; the columns are divided by bold straight lines. The characters are those usually called the Persepolitan or arrow-headed, but better described by the French as nail-headed. They are found very widely spread over Asia, but most plentifully at Persepolis. No one has hitherto made any considerable progress in deciphering them, nor have the learned been able to determine whether they are alphabetic, syllabic, hieroglyphic, or signs representing one or more words, as in the Chinese.

Curious as are these specimens of Assyrian art, Babylon presents us with others still more choice. These are a kind of cylinder, shaped like a barrel, but rather longer in proportion to the width. The one described is seven inches in height, and three inches in diameter at the ends; it is made of fine clay, and baked. The inscriptions are in the same character as those found upon the bricks, arranged in vertical lines, commencing, or ending, according to the way of reading, near the middle of the cylinder, where it is of the greatest diameter, and running down to the foot. There are consequently two inscriptions, one on either half; and there is an interval running *round* the cylinder between the two, without any impression. Counting upon a drawing, there are thirty-two vertical lines in either inscription, and consequently they are less than a quarter of an inch in width. There are thirty figures in one of the columns; and each figure would therefore occupy a space of less than one eighth of an inch. The figures are perfectly sharp and distinct, and the whole cylinder is a beautiful specimen of art. The one to which we allude is in the library of Trinity College, Cambridge; but many very excellent specimens have lately been deposited in the British Museum, an actual inspection of which, and of other cognate relics, will enable the curious

to form a much better idea of their excellence than any description, however diffuse. They are of all sizes, from a foot in height to the size of a signet, to which purpose probably they were sometimes applied, since some specimens are perforated as if intended for the insertion of a wire or cord; indeed there are specimens of somewhat similar cylinders with the wire inserted for thumb-rings. Perhaps those a little larger were hung round the neck as charms and amulets.

That a similar art was known to the inhabitants of the old world generally, may safely be assumed. It is therefore not a little remarkable that people so original and ingenious as the Greeks, and so imitative as the Romans, should have left almost no vestige of their having practised any such mean as this to multiply their beautiful creations of fancy, or to embellish the tasteful appliances of domestic life; especially when we consider the easy adaptation of the art to pottery, and the beauty, taste, and ingenuity which they exhibited in that manufacture. For, excepting a few paltry designs *en creux* on some of the coarser specimens, and a few marks upon the Roman military vessels, evidently stamped, there is no appearance of either people having had any idea of this kind; the sister art of taking impressions in seals not being fairly to be classed under this head. There are, however, in the British Museum some instruments presenting a singular instance of how very nearly one may approach to an important discovery, and yet pass on unheeding. These stamps are of brass, and amongst others the signet of C. Cæcilius Hermia. The face of this is two inches by four fifths of an inch, and the inscription,



with a border, is in relief, the surrounding parts being cut away to a considerable depth. It should be especially noticed, that the surface of the field is very rough; and there is a ring at the back by which it could be handled or suspended.[1] These circumstances render the use of it very clear. It would be very much easier to incise the required inscription, and to let the field stand (indeed the art of engraving *en creux* was well known and used), than to cut away the field and leave the letters in relief; and it would produce a much more beautiful effect if it were used to impress any soft substance; whereas, cut as it is, the impression sunk into the wax or clay would not only be ugly, but illegible, and the rough surface of the field would present the most ungainly appearance upon the prominent parts of the wax, being the parts most presented to the eye. Its use therefore is evident. The relieved inscription, and no other part, being covered with ink or pigment, was impressed upon an even surface (papyrus, linen, parchment), and consequently left a perfect but reversed imprint of itself. This is the precise effect of printing with types. Now, from the circumstance of Cæcilius being a person of no known eminence, it is a fair conclusion that such an instrument was not uncommon amongst those who either were not able to write,

[1] The Antiquarian Society of Newcastle possesses a similar stamp with a Greek inscription.

or were engaged in public employments requiring a great number of signatures, or who were accustomed to commit the signing of documents to subordinates on their behalf. From the Greek agnomen, Cæcilius probably lived under the emperors, when literature had become one of the pursuits of the great, and when the difficulties and expense of procuring books by the slow process of copying were bitterly felt. It is singular, therefore, that they should have overlooked so obvious an improvement upon their own signets as the engraving whole sentences and compositions upon blocks, and thence transferring them to paper, even if they had gone no farther than this.[1]

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[1] The Chinese printing is not unlike this, and must by no means be supposed to have much similarity to the modern art. They assert that it was used by them several centuries before it was known in Europe; in fact, fifty years before the Christian era. They certainly may have used their method centuries before our art, for it differs in nothing but extent from that of the old Roman. The following is a description of their method at the present day, and it is probably the same in every respect as that in practice two thousand years ago in an empire where nothing is changed. As their written language consists of from eighty to one hundred thousand characters, it would be utterly impracticable to use moveable types, and the use of block-printing would be the most easy and rapid. The sentences, therefore, desired to be multiplied, being drawn upon their thin paper, this is made to adhere with the face downward to a block of soft wood, so that the characters appear through *reversed*. The plain wood is then cut away with most wonderful rapidity, and the drawing left in relief. Both sides of the block are similarly operated upon. The engraved wood is then properly arranged upon a frame, and the artist, with a large brush, covers the whole surface, the field as well as the relief, with a very thin ink; he then lays very lightly over it a sheet of paper, and

From this time a vast period elapses before any circumstance can safely be instanced as showing that the practice of transferring characters was known to any, even comparatively civilized people. From the rough and imperfect attempts above indicated, the first and most obvious advance was engraving pictures upon wooden blocks. The first practice of this is involved in obscurity, but most writers on the fine arts agree that the art was invented towards the end of the thirteenth century, by a brother and sister of the illustrious family of Cunio, lords of Imola, in Italy. By some the whole narrative is considered as apocryphal, but it is nevertheless generally admitted. The engravings were discovered by a Frenchman of the name of Papillon, in the possession of a Swiss gentleman, M. de Grœder, who deciphered for him the manuscript annotations found upon the leaves of the book in which they were bound. These purported that the book had been given to Jan. Jacq. Turine, a native of Berne, by the Count of Cunio, with whose family he, Turine, appears to have been intimately acquainted. Then follows

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passes a large soft brush over it, so slightly, yet so surely, that the paper is pressed upon the raised figures, and upon no other part. The rapidity with which this is performed is extraordinary; for Du Halde asserts that one man can print ten thousand sheets in one day, a number which would appear incredible, did not very good testimony exist at the present time that one man can print seven hundred sheets per hour. The method of putting the thin sheets together when printed, is as different from ours as their printing and mode of reading. The sheets are printed on one side only; but instead of the blanks being pasted together to form one leaf, the sheet is so folded that no single edge of paper is presented to the reader, but only the double folded edge; the loose edges being all at the back of the book.

a romantic history of the twins, and the cause of their invention. The book is entitled "The Heroic Actions, represented in figures, of the great and magnanimous Macedonian king, the bold and valiant Alexander; dedicated, presented, and humbly offered to the most Holy Father Pope Honorius IV., the glory and support of the church, and to our illustrious and generous father and mother, by us Alessandro Alberico Cunio, cavaliere, and Isabella Cunio, twin brother and sister; first reduced, imagined, and attempted to be executed in relief, with a small knife, on blocks of wood, made even and polished by this learned and dear sister; continued and finished by us together, at Ravenna, from the eight pictures of our invention, painted six times larger than here represented; engraved, explained by verses, and thus marked upon the paper, to perpetuate the number of them, and to enable us to present them to our relations and friends, in testimony of gratitude, friendship, and affection. All this was done and finished by us when only sixteen years of age." This title is here given at full length, because, if genuine, it presents us at once with the origin, execution, and design of these first attempts at block-printing. The book consists of nine engravings including the title; the figures are tolerably well designed, and the draperies graceful, with here and there attempts at cross-hatching; under the principal personages are their names; above, are inscriptions indicating the subject, and below, four lines of poetical Latin explanatory of it; and in some part of each print is an inscription indicating the share the twins respectively had in the execution. The colour of the pigment is gray.

The first subject is Alexander on Bucephalus. Upon a stone, *Isabel. Cunio pinx. et scalp.*

The second subject, the Passage of the Granicus. *Alex. Alb. Cunio Equ. pinx. Isabel. Cunio scalp.*

The third subject, Alexander cutting the Gordian Knot. *Alex. Albe. Cunio Equ. pinx. et scalp.*

The fourth subject, Alexander in the tent of Darius. *Isabel. Cunio pinx. et scalp.*

The fifth, Alexander giving Campaspe to Apelles. *Alex. Alb. Cunio Eques pinx. et scalp.*

The sixth, the Battle of Arbela. *Alex. Alb. Equ. et Isabel. Cunio pictor. et scalp.*

The seventh, Porus brought to Alexander. *Isabel. Cunio pinx. et scalp.*

The eighth, the triumph of Alexander upon his entry into Babylon. *Alex. Alb. Equ. et Isabel. Cunio pictor. et scalp.*[1]

From the dedication of this book to Pope Honorius IV., it is deduced that these engravings must have been executed between 1284 and 1285, inasmuch as this pope only enjoyed the pontificate two years; and it is suggested that a copy of it might be found in the library of the Vatican. The narrative appears to be confirmed by many incidental circumstances, which bear every evidence of not being the invention either of Papillon or his informer. The name of Alberico seems to have been a favourite with the family of Cunio, and a count of that name actually figures in history in the very year of the presumed invention; a relative of the twins, of course, not the male artist himself.

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[1] It is not unlikely that the twins may have been directed in the choice of their subject by the identity of the name of the great conqueror with that of the brother; at least such coincidences are not without parallel in the history of literature.

The interval between the time of the twin Cunio and the next mention of any similar usage is very perplexing; but upon examination it will appear that that long period was not altogether a blank in the art. The next earliest evidence is a document of the government of Venice, discovered amongst the archives of the Company of Printers in that city. It bears the date of 1441, and as it throws some degree of light upon the controversy relative to the invention of printing, it is here given from Ottley's History of Engraving.

"M CCCC XLI. October the 11th. Whereas the art and mystery of making cards and printed figures, which is used at Venice, has fallen into total decay; and this in consequence of the great quantity of playing-cards, and coloured figures printed, which are made out of Venice; to which evil it is necessary to apply some remedy; in order that the said artists, who are a great many in family, may find encouragement rather than foreigners. Let it be ordered and established, according to that which the said masters have supplicated, that from this time in future, no work of the said art that is printed or painted on cloth or on paper, that is to say, altar-pieces (or images), and playing-cards, and whatever other work of the said art is done with a brush or printed, shall be allowed to be brought or imported into this city, under pain of forfeiting the works so imported, and xxx livres and xii soldi, of which fine one third shall go to the state, one third to the Signori Giustizieri Vecchi, to whom the affair is committed, and one third to the accuser. With this condition, however, that the artists who make the said works in this city may not expose the said works to sale in any other place but their own shops, under the pain aforesaid, except on the day of Wednesday

at St Paolo, and on Saturday at St Marco, under the pain aforesaid."

From this it seems manifest that the art of printing from wood-blocks was not lost, but, on the contrary, had been so long practised as to become an extensive and profitable business in Venice, and to spread over the Continent to such a degree as in turn to destroy the trade of the Venetian artists. The establishment of an important manufacture, and its decay, necessarily infer a long period. From the constant conjunction of the two arts of painting and printing in this document, we may infer (what the existence of prints and cards of later date prove) the method in which these figures and cards were manufactured, namely, that the outline was first printed, and that the colours and shading were filled in by the printer and illuminator. The history of playing-cards now becomes of some importance to the narrative. When cards first came into use is uncertain; but mention is made of them in the year 1254, when they were interdicted by St Louis on his return from the Crusade: they were also forbidden by the council of Cologne in 1281. In 1299 they are expressly mentioned under the name *carte;* and in "Das Gülden Spiegel," printed by Gunther Zainer in the year 1472, it is said that cards first came into Germany in 1300. An old French poet, who wrote "En l'an mil iij cent xxviij," has the line, "Jouent aux dex, aux cartes, aux tables." There is no evidence earlier than the Venetian decree to connect the art of printing from wood-blocks with the art of making cards; but as it is evident from that document that such connection did exist, it is a fair presumption that it originated not very long after the introduction of the game; and as the sum paid by Charles VI. for "trois jeux de cartes"

was so small as fifty-six Parisian sols, it has been conjectured that they must have been illuminated prints. The Venetian decree against the importation of painted and printed figures from abroad now brings us to the country from which the chief export was made. It appears, therefore, that in the Low Countries the manufacture was carried on to a great extent; and we shall also find that in Holland and Germany, and probably over most of Europe, religion had called this art to her aid; that whilst the noble and wealthy recreated the mind and delighted the eye with the exquisite productions of the scribe and illuminator, the more humble were equally gratified with rude and simple illustrations of interesting portions of Scripture, or pictures of favourite saints. It is probable that the poorer classes hung up these drawings in their dwellings, where they excited as true and heartfelt devotion as the masterpieces of Raffaelle or Correggio in the oratories of the great. It cannot be ascertained how early this practice commenced, nor whether it preceded and suggested the printing of saints and sacred subjects, or was itself a consequence. Certain it is, that at the end of the fourteenth and the commencement of the fifteenth century the practice was very common. The impressions were taken by means of a burnisher, the gloss caused by the friction being distinctly visible on the backs both of cards and prints preserved to this time. As facility in practice increased, a distich or quotation illustrative of the print became a natural improvement; and to this was frequently added a coat of arms, the name of the saint, or the title of the subject, all in the field, or over the head of the figure; and, lastly, sometimes a date. The earliest print of which the date can be accurately ascertained, is a wood-cut of St Christopher carrying the infant Jesus across

the sea. It is of folio size, and coloured in the manner of our playing-cards. At the bottom is the inscription,

Cristofori faciem die quacunque tueris Millesimo cccc°
Illa nempe die morte mala non morieris. xx° terno.

It was found in the monastery of Buxheim, near Meiningen, and is now in the possession of Earl Spencer.

The next advance was obvious. Instead of a single block, a series of blocks were employed, with additional literary illustrations; and thus were the first printed books formed. The most important of these is the *Historiæ Veteris et Novi Testamenti seu Biblia Pauperum*, truly the Poor Man's Bible. It consists of forty leaves printed upon one side of the paper only, by friction, from as many blocks; the colour is brown; the pages are placed opposite to each other, and the blank backs being pasted together, form one strong leaf. The cuts are about ten inches in height and seven and a half in width. Each print contains three sacred subjects in compartments, and four half-length figures of prophets in smaller divisions, two above and two beneath the principal subjects. Latin inscriptions are on either side of the upper figures, rhythmical verses on either side of the lower, and additional inscriptions are on labels at the bottom of the whole. The central subjects are from the New Testament, the others from the Old, and in some manner allusive to the former. There are many copies of this work, evidently from different blocks, and of different dates. Indeed it appears to have been a most popular book, and was printed repeatedly long after the introduction of legitimate printing; there are several editions in which the inscriptions are actually printed with moveable types. The exact date of these curious works is not ascertained, but Dr Horne possessed a copy contained in one volume with the *Ars Moriendi* and the *Apocalypse*, all works

of the same style, the binding of which bore the date of 142( ). The original composition and design of this work is attributed, and not without some show of reason, to Ansgarius, who was bishop of Hamburg and Bremen in the ninth century. (See Plate CCCCXIII.)

A similar book is the *Canticles*, a small folio volume of thirty-two subjects, two being printed on each leaf, and on only one side of the paper, and the leaves also pasted back to back. It differs from the *Biblia Pauperum* in that the inscriptions are engraven on scrolls fantastically dispersed amongst the figures. This is generally allowed to be of somewhat later date than the preceding, and to hold an intermediate space between it and the *Speculum Humanæ Salvationis*, to which a larger space must be devoted, on account of its importance in the controversy relative to the invention of printing.

This is not, strictly speaking, a block-book; for whilst the form of the design and the portion of Scripture represented are engraven on wood, the inscription is in some cases engraven on wood also, but in others printed in *moveable type*. The Latin edition, *perhaps* the first, consists of sixty-three leaves, divided into five unequal gatherings. The subjects are chiefly from the Old and New Testament; but sometimes such stories have been selected from ancient history as might seem in some way appropriate to the events recorded in sacred writ. Each subject has a short Latin inscription underneath it, and the text occupies the remainder of the page. Its size is folio; the impressions are taken with a burnisher, on one side of the paper; the colour of the ink is brown, and the backs are pasted together, as in the books previously described. The work is certainly of nearly the same date, though a little later, than the *Biblia Pauperum*;

and it may even have been in part executed by the same artist, for in the earlier portions there is so much general resemblance, both in design and execution, as to make it probable that the same graver was employed in both. The latter part, however, is the work of another artist; the lines are not so bold, and there is an attempt at fineness of execution, of shading, and of distance, which the earlier master did not attempt. The design, though in better drawing, is not so spirited; the drapery is more correct, though not so graceful; and in fact the engraver was a better workman, but not so great an artist. It must be understood, that there are numerous editions of this work, many differing in essential particulars, but some so nearly similar as to require a microscopic eye to detect the variations; of four of these, two are in Latin, two in Dutch, and between these four lies the contest for antiquity. Mr Ottley (whose beautiful work on Engraving contains a well-drawn-up account of his inquiry, illustrated by most convincing examples) has, from a minute and laborious examination, decided that the two Latin and two Dutch are printed from the self-same blocks, and by comparing them, and finding evidences of fractures in the one which do not exist in the other, he has very satisfactorily awarded the palm of antiquity. First, although the Latin inscriptions in the earlier part of the *first* Latin edition (so called by commentators) are engraven on blocks of wood, these blocks are not of the same piece as the figures, the work having been divided between two artists, the one more skilled in engraving figures, and the other in engraving letters. Secondly, parts of the engraving broken in the *first* Dutch are perfect in the *first* Latin; parts imperfect in the *first* Latin are unbroken in the *second* Dutch, whilst the *second* Latin is the most perfect of all; from

which the conclusion is drawn that the *second* Latin is the most ancient, then the *second* Dutch, next the *first* Latin, and lastly the *first* Dutch. The printing of this work is claimed for Laurence Koster.

We have now come fairly to the practice of printing in the real sense of the word; and we have also arrived at the long-pending, long-controverted question, of who invented it, and where? The honour is disputed by as many cities as contended for the birth of Homer. Only three of these can show the slightest argument for their pretensions; Harlem, Strasbourg, and Mentz. Harlem claims it for her citizen Laurence Koster, or Laurent Janszoon Koster (or Custos). The claim rests principally upon the narrative in the *Batavia* of Hadrianus Junius, a native of West Friesland, who dwelt at Harlem. The work was written in 1575, but not published until 1588. The following is a close translation of the narrative:—

"There lived, a hundred and twenty-eight years ago, at Harlem, in houses sufficiently splendid (as a workshop, which remains to this day entire, can serve as proof), overlooking the forum from the neighbourhood of the royal palace, Laurentius Joannes, by surname *Ædituus*, or Custos[1] (which at that time lucrative and honourable office an illustrious family of that name, *or a family illustrious by*

[1] In the original, Koster is simply said to have been surnamed *Ædituus*, seu *Custos*, but no mention is made of the Cathedral. The statement, therefore, that he was custos of the cathedral, is a gratuitous insertion of after narrators. The word custos has been Dutchified into Coster or Koster; but there is no apparent reason why we may not suppose that *Custos* was a barbarous Latin word for keeper, or constable, or any other translation the word will bear.

that name, held by hereditary right), the person who now seeks back by just avouchments and oaths the relapsing (*recidivam gloriam*) glory of the invention of printing, nefariously possessed and seized upon by others (the man), with the greatest right to be presented with greater laurel of all honours (*summo jure omnium triumphorum laurea majore donandus*). He by chance, walking in a suburban grove (as was the fashion of citizens in easy means to do after dinner in those days), began first to fashion beech-bark into letters, which being impressed upon paper, reversed in the manner of a seal, produced one verse, then another, as his fancy pleased, to be for copies to the children of his son-in-law; which when he had happily accomplished, he began (for he was of great and acute genius) to agitate higher things in his mind, and first of all devised with his son-in-law, Thomas Peter, who left four children, all of whom attained the consular dignity (a thing which I mention that all may understand the art arose in an honourable and talented, not a servile family), a more glutinous and tenacious species of writing ink, which he had commonly used to draw letters; thence (*experiretur*) he expressed entire figured pictures with characters added; in which sort I have myself seen *Adversaria* printed by him, the traces of the works (*operarum*) being only on opposite pages, not printed on both sides (*haud opistographis*). That book was in the vernacular tongue by an anonymous author, bearing for title *Speculum Nostræ Salutis:* in which it is to be observed among the first beginnings of the art (for never any is found and perfected at once), that the reverse pages being smeared with glue, were stuck together, lest they, being blank, should present a deformity. Afterwards he changed beech-blocks for lead; afterwards

he made them of tin, because it was a material more solid and less flexible, and more durable: from the relics which remained of which types, very ancient wine-flasks being made, they are to this day to be seen in those houses of Laurentius which I have mentioned looking upon the forum, inhabited afterwards by his grandson Gerard Thomas, whom I name for honour's sake, a noble citizen, who departed this life a few years ago. The studies of men favouring, as it happened, the new art, since a new merchandise, never before seen, brought buyers from every side with most eager quest, at once the love of the art increased, the establishment (*ministerium*) increased, workmen in the art being added to the family, the first touch of evil; among whom was a certain Joannes, either (as the suspicion is) that Faustus of ominous name, faithless and unlucky (*infaustus*) to his master, or some other of the same name, I do not greatly care which, because I am unwilling to disquiet the shades of the silenced, touched with the plague of conscience while they lived. He being sworn by oath to the processes of printing, after he had (as he thought) learned thoroughly the art of putting the characters together, the knowledge of fusile types, and whatever else may relate to the matter, taking an opportunity, than which he could not have found one more fit, on the very eve which is sacred to the birth of Christ, on which all in common are accustomed to labour at the sacred ceremonies, stole the whole materials,[1] tied up a package of the instruments of his master used in that art (*instrumentorum herilium ei artificio comparatorum supellicticem convasat*); thence with a ser-

[1] Or whatever else *choragium* may mean; literally it signifies the *properties* of a theatre.

vant hurried from the house, went in the beginning to Amsterdam, thence to Cologne, until he arrived at Mayence, as to the altar of an asylum, where he might live safe beyond the reach of arrows (as the saying is), and having opened an office, enjoyed the rich fruit of his robberies. Indeed, from it, in the space of the (or a) turning year, in the year 1442 from the birth of Christ, with the same types which Laurentius had used at Harlem, it is certain that he produced to light the *Doctrinale* of Alexander Gallus, which grammar was then in most famous use, with the *Tractates* of Peter Hispanus, his first productions. Those are, for the most part, things which I have formerly heard from aged men worthy of belief, who have received them as things delivered from hand to hand, as a torch in a race, and have found others relating and attesting the same things. I remember that Nicholaus Galius, the instructor of my youth, a man with iron memory, and venerable for his long years, related to me, that when a boy he had heard, not once only, a certain Cornelius, a bookbinder, and rendered serious by age, nor less than eighty years old (who had lived as an under workman in that office), relating with much mental anger, and with fervour, the course of the proceeding, the manner of the invention (as he had received it from his master), the improvement and increase of the art, and other things of the kind; and that the tears would burst from him against his will at the shame of the affair, as often as he talked of the robbery. Which things do not differ from the words of Quirinus Talesius Con., who confessed to me that he had formerly the same from the mouth of the same bookbinder."

Beyond this narrative of Hadrian Junius there is little, or rather no, testimony to the truth of Koster's claim, all

subsequent argument being either drawn from or referred to this statement. Many very learned bibliographers have given full credence to Hadrian, whilst others not less acute absolutely deny Koster any pretence whatever, Santander calling in question his very existence; and there is a third party who, being unable to decide between the opposing arguments, and willing to take refuge in a middle course, allow to Koster the credit of having invented printing from blocks, but assign to his rivals that of printing from moveable types.

The whole argument may, however, be reduced into a reasonable compass. The probability of Hadrian's narrative will naturally be the subject of inquiry. *First*, the roundabout way in which this hearsay evidence reached Hadrian, is in itself a very suspicious circumstance. Little belief can be accorded to an uncertain bookbinder, even had any circumstances been adduced besides the name Cornelius, by which this bookbinder could be identified. *Secondly*, Talesius was many years secretary to Erasmus, who, although a Dutchman, and resident in Holland, repeatedly and unhesitatingly ascribes the invention to John Gutenberg of Strasbourg at Mentz.[1] It is not at all probable, that had Erasmus ever heard of this story, or given the slightest credence to it if he had, he would have omitted some mention of

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[1] Anno Christi 1440. Magnum quoddam ac pene divinum beneficium collatum est universo terrarum orbi, a Johanne Gutenberg Argentinensi, novo scribendi genere reperto. Is cum primus artem impressoriam, quem Latini vocant *excusoriam*, in urbe Argentinensi invenit; inde Moguntiam veniens eandem feliciter complevit. (*Epit. Rerum Germ. Script.* 1502, cap. 95.)

a circumstance so gratifying to his national vanity; or that he should have remained in ignorance of a story well known to his secretary, and commonly bruited about, and therefore known to some of the learned men amongst whom Erasmus lived. *Thirdly*, the story of the engraving on beech-bark accidentally, when it is quite certain that the art of taking impressions from wood-blocks for saints and cards was at the time known and extensively practised in Holland and Germany, and also in Italy, is absurd. *Fourthly*, every author who has written upon the matter has given up all claim on Koster's behalf for the invention of cast type, the evidence in favour of others being too strong to be got over. *Fifthly*, the tale of the conversion of these types into drinking-cups, when Hadrian afterwards states that Fust carried them off with him, is incredible; for Koster's death is variously stated as having occurred in 1440 or 1442, and Hadrian says that Fust published his *Doctrinale* in 1442, within a year of his unlicensed departure; and therefore Koster could not have had time to construct the types afterwards converted into cups. *Sixthly*, the story of John Fust having stolen all his printing materials on the eve of Christmas, and decamped, first to Amsterdam, then to Cologne, and lastly to Mentz, and his publishing there within the same year, is self-contradictory; for type is not a very portable commodity; nor would he easily have escaped pursuit at Amsterdam, a town under the same government. Again, John Fust was originally no printer, but a wealthy goldsmith of Mentz, and certainly never worked as any body's journeyman. Indeed this is such a palpable misstatement, that commentators upon Hadrian have boldly supposed that the thief was John Gutenberg, not he of Mentz, but a brother, also named John. Unfortunately Gu-

tenberg's brother was not named John, but Friele, and in no future document is there any mention of him or his father having practised the art even when known to John; nor is it at all likely that members of a noble family, and wealthy men, should have worked in the service of any man. If it should be asserted that it was *the* John Gutenberg, his time is so well accounted for that it is impossible, since he was then resident at Strasbourg, and never was at Amsterdam or Cologne. Thus, then, the narrative of Hadrian Junius appears, upon examination, to be utterly incredible, being at once at variance with itself and with all probability.

There are, moreover, other arguments not precisely resting upon this narrative; for although these circumstances are not to be believed, the main facts *may*, nevertheless, be correct. Koster *may* have printed the *Speculum* and other block-books attributed to him. Ottley says that they were certainly printed in Holland, for that the types are not those used in Germany, but closely resembled such as were afterwards cut or cast in Holland; and that they are of greater antiquity than any books printed by those who afterwards used the art in the Low Countries. He also attempts to show, by the water-marks in the paper, that the works in question were produced in these parts. Water-marks, however, and some bearing a general resemblance to these, were common in the papers used by printers of Cologne, Louvain, and elsewhere; and the argument is worth little or nothing, for no evidence can be given of the positive dates of these works, and much less of the printer. The *Speculum* was printed again and again after the invention of letter-press printing; nor is there the slightest evidence, supposing these assertions to be correct, to connect them with the name of Koster.

It is a conclusive argument *against* him, that those other works ascribed to him and his descendants are executed with the self-same types used at Utrecht in 1473 by Ketelaer and De Leempt. Van Mander, who lived at Harlem in 1580, in his History of the Lives of Dutch Painters and Engravers, treats the claim of Harlem with contempt; for, speaking of printing, he describes it as an art "of which Harlem, with much presumption, arrogates to herself the honour of the invention;" nor does he make the slightest mention of his famous fellow-citizen.

There is not the least evidence that his *three* grandsons (not *four*, as Hadrian says) ever carried on his business; for where are their works? and in their time printers had become so proud of their art, as not only to put their names to every work, but even to add a long history of their undertaking and progress. Where are the books ascribed to them? what mention is made of them by their contemporaries? In a subsequent part of this article it will be seen that Caxton, the first English printer, is said to have been sent to Harlem to learn the art, and if possible to carry off one of the workmen. These things being also matter of controversy, cannot fairly be used in argument; nevertheless it is of some value that Caxton, who, supposing it to be true, would be an excellent witness in favour of Harlem, upon all occasions refers the invention to Gutenberg, and makes no mention whatever of Harlem or Koster.

Santander labours to disprove the very existence of any such person. But there is no necessity to go so far as Santander; we may allow Koster's identity; we may even allow that he practised the art of taking impressions from wood-blocks; but this is very different from acknowledging any claim to the invention of the art of printing. The most stre-

nuous champion of Koster is Meerman, an eminent French bibliographer of the last century, who, in his *Origines Typographicæ*, published at the Hague in 1765, strongly maintains this narrative of Hadrian; which is not a little singular, seeing that the Newcastle Typographical Society published a letter from him to Wagenaar, of eight years prior date, in which he expresses a precisely contrary opinion. He calls Seitz's (Hadrian's) story a mere supposition, and the chronology a romantic invention; gives to the *Speculum* the date of 1470 as the earliest possible; attributes the honour to Gutenberg, and incidentally mentions his intention of publishing a pamphlet on the subject. Notwithstanding this, in his work, without any new fact whatever, he accredits Hadrian's story, finds consistency in the dates, believes the *Speculum*, and denies John Gutenberg; completely reversing his previous opinion, though, by changing the predicates, his narrative may still stand. The *Divisiechronyk*, in 1517, places printing amongst foreign discoveries.

All evidence, and the general consent of the learned, in failure of Koster, unhesitatingly ascribe this invention to

John Gutenberg, surnamed Genzfleisch, Gensfleisch, or Gensefleisch, von Solgenloch, or Sorgenloch. He was a native of Mentz, and of a noble family, possessed of considerable property in various places in the neighbourhood. Fortunately the life of Gutenberg does not rest merely upon hearsay evidence, or the doubtful guesses of bibliographers from dateless wood-cuts; legal documents supply most important information. It appears that, for some reasons unknown, he resided for many years at Strasbourg, and had even acquired rights of citizenship. The first document presents him in no amiable light. It is a lawsuit instituted to compel him to perform his marriage-contract with Anne

von Isernen Thür; and it would appear that he was compelled to make good his promise, the name of Anne Gutenberg being found in the same register of the nobility liable to the wine-duty in the city of Strasbourg, in which Gutenberg's name also appears. The next document is so curious that an ample abstract of it cannot but be interesting.

It appears that he had contracted an engagement with Andrew Dritzehen, John Riffe, and Andrew Heilmann, to instruct them in the secrets of certain arts, and had entered into partnership with them for their better advantage. Andrew Dritzehen and Andrew Heilmann having called upon him one day, perceived that he was engaged in a wonderful and unknown art, the secret of which he was desirous of keeping to himself; that, moved by their importunities, he consented to enter into partnership with them for the term of five years, on two conditions, first, that they should pay him the sum of 250 florins, 100 immediately, and the remainder at a certain fixed period; second, that if any one of the partners should die during the term of the copartnership, the survivors should pay to his heirs the sum of 100 florins, in consideration of which the effects should become the property of the surviving partners. Andrew Dritzehen died before the expiration of the period agreed on, being still indebted to Gutenberg in the sum of eighty-five florins. George and Nicholas, brothers of the deceased, demanded to be admitted to the partnership, and on refusal brought an action against Gutenberg as principal partner. The magistrates gave judgment on the 12th of December 1439, relieving Gutenberg from the demand upon payment of the sum of fifteen florins, being the difference of the sum of 100 florins stipulated to be paid to the heirs of a deceasing partner, and the sum of eighty-five florins due to Gutenberg

by Andrew on the original contract. The following evidence was produced on the trial :—

"Anna, the wife of John Schultheiss, an engraver on wood, deposed, that on one occasion Nicholas Beildeck came to her house to Nicholas Dreizehen, her relation, and said to him, 'My Nicholas Dreizehen, Andrew Dreizehen, of happy memory, has placed four pages (*stücke*) in a press, which Gutenberg has desired that you will take away and separate, that no man may know what they are, for he is unwilling that any one should see them.'

"Also John Schultheiss says, that Laurence Beildeck sometime came to his house to Nicholas Dreizehen, when Andrew Dreizehen his brother was dead, and that the said Laurence Beildeck thus spoke to said Nicholas Dreizehen: 'Andrew Dreizehen, of happy memory, has placed four pages on a press, which John Gutenberg desires you to take therefrom, and place them on the press and break them from one another, so that no man may see what they are.'

"Also Conrad Sahspach deposed, that sometime Andrew Heilman came to him upon the Street of Merchants and said, 'My Conrad, as Andrew Dreizehen is dead, and you made that press, and know all about the matter, go hence and take the pieces from that press and lay them separate from one another, so that no man may know what it is.'

"Laurence Beildeck says that he was sent by John Gutenberg to Nicholas Dreizehen, after the death of Andrew his brother, to say to him that he should show to no one the press that he had, and that he should see to it. He added, that Gutenberg had moreover commanded him that he should go suddenly to the presses, and open that press which was furnished with two *screws* or spindles (*cochleis*), that the pages should fall into pieces, and place those pieces

within or upon the press, so that no one should see the matter, or understand what it was.

" The same witness also said that he knew well that Gutenberg, a little before the feast of the Nativity, had sent his servant to both Andrews to take away all forms, which were broken up in his sight, that none of them might be found perfect. Moreover, after the death of Andrew, this witness was not ignorant that many were desirous of seeing the presses, and that Gutenberg had commanded that some one should be sent who might hinder any one from seeing the presses, and that his servant was sent to break them up.

" Also John Dunne, goldsmith, said, that three years or thereabouts previous he had received from Gutenberg about 300 florins for materials relating to printing."

From this curious document may be learnt, that separate types were used; for if they were blocks arranged so as to print four pages, how could they be so pulled to pieces that no one should know what they were, or how could the abstraction of two screws cause them to fall to pieces? It appears that some sort of presses were used, and the transfers no longer taken by a burnisher or roller; and, lastly, that the art was still a great secret at the time when Koster was at the point of death. Hence it is manifest, that the ingenuity of Gutenberg had made a vast advance from the rude methods of the time, and had in fact invented a new and hitherto unknown art.

These documents would be decisive in favour of Strasbourg as the place in which printing was invented, had it appeared that any effects were produced by this establishment. This, however, does not seem to have been the case, as Gutenberg and his successors make no mention of the fact, but, on the contrary, claim for themselves the produc-

tion of the first book at Mentz. Indeed the partnership appears to have expired without any attempt at entering into fresh engagements; for, about the year 1450, Gutenberg returned to his native city with all his materials, without any opposition from his partner. In this place he entered into partnership with John Fust, a wealthy goldsmith and citizen, who engaged, upon being taught the secrets of the art, and being admitted into a participation of the profits, to advance the necessary funds; and he did accordingly advance the considerable sum of 2020 florins, a fact that completely overthrows the fable of his having been one of Koster's workmen, and of his having stolen his types. The new partnership immediately commenced operations, and hired a house called Zum Jungen, and took into their employ Peter Schœffer and others. Their subsequent operations we again find curiously chronicled in the records of another lawsuit,[1] in which Gutenberg was soon engaged with his new ally; for Fust, dissatisfied with their proceedings, sought to recover from Gutenberg money advanced, with interest, including 800 florins of the sum advanced in virtue of the deed of partnership. Gutenberg in defence alleged, that the 800 florins had not been paid at once, as stipulated; and that they had been expended in preparation for the work (apparently meaning thereby, that this sum of money should have been paid down for his own use, in consideration of his communicating the secrets of his art, and that instead of so applying it to his private purposes, he had expended it for the joint benefit); whilst, as to the other

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[1] Wolfii *Monumenta Typographica*. Fournier, *Origine de l'Imprimerie*.

sums, he offered to give an account of their appropriation, but denied that he was liable for the interest. The judges awarded that Gutenberg should pay the interest, as well as the part which his accounts showed he had applied to his individual use. This decision took place on the 6th of November 1455. Upon this Fust obtained from the public notary the following document:

" To the Glory of God, Amen. Be it known unto all those who shall see or hear read this instrument, that in the year of Our Lord 1455, third indiction, on Thursday the sixth day of November, the first year of the Pontificate of our very Holy Father the Pope, Calixtus III., appeared here at Mayence, in the great parlour of the Bare-footed Friars, between eleven o'clock and mid-day, before me, the Notary, and the undersigned witnesses, the honourable and discrete person, James Fust, citizen of Mayence, who, in the name of his brother, John Fust, also present, has said and declared clearly, that on this same day, and at the present hour, and in this same parlour of the Bare-footed Friars, John Gutenberg should see and hear taken by John Fust an oath, conformable to the sentence pronounced between them. And this sentence read in the presence of the honourable Henry Gunter, Curé of St Christopher of Mayence, of Henry Keffer, and De Bechtoff de Hanaw, servant and valet of the said Gutenberg; John Fust, placing his hand upon the Holy Evangelists, has sworn between the hands of me, the Notary Public, conformable to the sentence pronounced, and to a letter which he has sent to me, and has taken the following oath, word for word: I, John Fust, have borrowed 1550 florins, which I have transmitted to John Gutenberg, which have been employed for our common labour, and of which I have payed the rent and annual in-

terest, of which I still owe a part. Reckoning, therefore, for each hundred florins borrowed, as above is recited, six florins per annum, I demand of him the repayment and the interest, conformably to the sentence pronounced; which I will prove in equity to be legal, in consequence of my claim upon the said John Gutenberg. In presence of the honourable Henry Gunter, of Henry Keffer, and of Bechtoff de Hanaw aforesaid, John Fust has demanded of me an authentic instrument, to serve him as much and as often as he hath need, in the faith of which I have signed this instrument, and have set thereto my seal."

From this it would appear (indeed the mortgage of his printing materials to Fust, mentioned in this document, proves) that Gutenberg had expended the whole of his considerable private fortune in his experiments, and had fallen into the power of his more wealthy associate; for in consequence of this judgment, and owing probably to his being unable to repay the sums demanded, the whole of his materials, constructed with so much perseverance, fell into Fust's hands; for the initial letters used by Gutenberg and his partners, in works known and supposed to have been executed between 1450 and 1455, are likewise used by Fust and Schœffer in the Psalter of 1457 and 1459. After such a mortifying result of so many years' labour, it would have been no matter for wonder had Gutenberg abandoned the unprofitable pursuit. On the contrary, he appears to have immediately started anew with fresh vigour, and this time with success. Another legal document gives curious information.

"We, Henne (John) Genszfleisch de Sulgeloch, named Gudinburg, and Friele Genszfleisch, brothers, do affirm and publicly declare by these presents, and make known to all,

that, with the advice and consent of our dear cousins, John, and Friele, and Pedirmann Genszfleisch, brothers, of Mentz, we have renounced and do renounce, by these presents, for us and for our heirs, simply, totally, and at once, without fraud or deceit, all the property which has passed by means of our sister Hebele, to the convent of St Claire of Mentz, in which she has become a nun, whether the said property has come to it on the part of our father Henne Genszfleisch, who gave it himself, or in whatsoever manner the property may have come to it, whether in grain, ready money, furniture, jewels, or whatever it may be, that the respectable nuns, the abbess, and sisters of the said convent, have received in common or individually, or other persons of the convent (have received), from the said Hebele, be it little or much; and we have promised and do promise, by these presents, in good faith, for us and for our heirs, that neither we, nor any person on our part, nor yet our said cousins, nor any of their heirs, nor any person on their part, shall either demand, gain, nor claim of the said convent, nor of the abbess, nor of the convent in general, nor of the persons who may be found therein individually, the said property, of whatever kind it may be, either wholly nor in part, and that we will never demand it again, either through an ecclesiastical or civil court, or without the aid of the law; and that neither we nor our heirs will ever molest the said convent, either by words or deeds, either secretly or publicly, in any manner. And as to the books, which I, the said Henne, have given to the library of the convent, they are to remain there always and for ever; and I, the said Henne, propose also to give in future, without disguise, to the library of the said convent, for the use of the present and future nuns, for their religious worship, either for reading

or chaunting, or in whatever manner they may wish to make use of them according to the rules of their order, *all the books which I, the said Henne, have printed up to this hour, or which I shall hereafter print, in such quantities as they may wish to make use of;* and for this the said abbess, the successors and nuns of the said convent of St Claire, have declared and promised to acquit me and my heirs of the claim which my sister Hebele had to the sixty florins, which I and my said brother Friele had promised to pay and deliver to the said Hebele, as her portion and share arising from the house which Henne, our father, assigned to him for his share, in virtue of the writings which were drawn up thereupon, without fraud or deceit. And in order that this may be observed by us and by our heirs, steadfastly and to its full extent, we have given the said nuns and their convent and order these present writings, sealed with our seals. Signed and delivered the year of the birth of J. C. 1459, on the day of St. Margaret."

From this it will appear, that his new establishment had actually produced the long wished-for effect. He appears to have carried on the business ten years; for in 1465 he entered into the service of Elector Adolphus of Nassau, as one of his band of gentlemen pensioners, with a handsome salary, as appears from the letters patent, dated the 17th January 1465, and finally abandoned the pursuit of an art which, though it caused him infinite trouble and vexation, has been more effectual in preserving his name and the memory of his acts, than all the warlike deeds and great achievements of his renowned master and all his house. Gutenberg died on the 24th of February 1468. His printing-office and materials had passed into the hands of Conrad Humery, syndic of Mentz, who had probably assisted him with money, and

who appears to have been in some degree his partner. He afterwards sold them to Nicholas Bechtermunze of Elfield, whose works are greatly sought after by the curious, as they afford much proof, by collation, of the genuineness of the works attributed to his great predecessor.

There does not appear to be any record of the early life of JOHN FUST or PETER SCHŒFFER before their partnership with Gutenberg, save that the former was a wealthy goldsmith and an ingenious man, and that Schœffer, surnamed de Gernsheim, was a scribe. It is very likely that the combination of character and qualifications of these three men may afford a good clue to the wonderful taste and beauty which distinguish the works issued from their press, and consequently to the great general improvement of the art during their life. The ingenuity of Gutenberg would readily suggest a new and expeditious method of manufacturing types; the practical skill of Fust as a worker in metals (and the working in gold and silver had at that time attained a most extraordinary nicety and beauty), and his large pecuniary resources, would readily supply the necessary appliances, while the taste of Schœffer would give all possible grace and beauty to the new forms. For Schœffer, it must be recollected, was a scribe, one of the ancient and honourable craft whose occupation was destined to fall before the new art; a transcriber, perhaps an illuminator, of the manuscript works in use before printed books; and those who have had the happiness of viewing those exquisite specimens of skill which beguiled our ancestors into study and devotion (when will modern typography produce such feasts for mind, and eye, and imagination?) will readily conceive that Schœffer's eye was already schooled for the conception, and his hand for the execution, of all the beauty the tram-

mels of a new art and limited skill would allow. Aided by his own taste and his partners' invention and wealth, Schœffer proceeded to a new enterprise, namely, the *casting* of type. The entire conception and execution of this invention has been generally attributed and allowed to Schœffer. It seems most probable, however, that where three ingenious men are bound together by art and interest, no one of them can lay exclusive claim to any invention or undertaking executed in the workshops and for the mutual benefit of all. Allowing, therefore, to Schœffer the honour of having suggested some such plan, the other two may fairly put in a claim for their portion of the credit on the score of their suggestion and assistance, especially since Fust, as a worker in metals, would have been the party to engage workmen to elaborate the conceptions of his partners' brain. Accordingly the only evidence upon the subject appears to show that the firm had for some time practised a method of taking casts of type in moulds of plaster; for it must be remembered that the types of Gutenberg's earlier efforts, both at Strasbourg and at Mentz, were cut out of single pieces of wood or metal with infinite labour and imperfection. The method of casting, however, although a great improvement, was at best but a slow and tedious process. Every new letter required a new mould; no skill or care could enable the workman to impress so small a thing as a type is at the face, yet so elongated in the shank, fully, freely, and steadily, into a soft material; and it would be necessary afterwards, under the most favourable circumstances, that the squareness and sharpness so indispensable in type should be given by another slow process, so that at best this advance was but an imperfect and tedious operation. Schœffer has therefore an undoubted claim to

be considered as one of the three inventors of printing ; for he it was who first suggested the cutting of punches, whereby not only might the most beautiful form of type the taste and skill of the artist could suggest be fairly stamped upon the matrix, but a degree of sharpness and finish quite unattainable in type cut in metal or wood could be given to the face ; whilst to the shank, by the very same process by which the face was cast, the mould would give perfect sharpness and precision of angle. Add to this, that the punch being once approved of, could be kept ready to stamp a new matrix in precisely the same condition and form as the first, should that be worn out or mislaid, or make a duplicate should the demands of business require it. It is nevertheless rather singular, that the mould represented on the right side of the press of Ascensius, shortly after the time of Schœffer, should be precisely the same in form and manner of use as that of the present day. This was evidently an immense stride towards perfection ; let Schœffer therefore take a place on the right hand of the inventor.

Within eighteen months of their separation from Gutenberg, Fust and Schœffer produced the celebrated Psalter. This was printed with large cut type. As it was impossible to prepare a new fount and print this splendid work in that short space, it must be evident that the partners did great injustice to Gutenberg in suppressing his name from the colophon. This book was produced in the month of August 1457, and is the first book which bears the name of the place where it was printed, those of its printers, and the date of the year in which it was printed. The first book, however, bearing date, was issued by Fust and Schœffer in 1455, viz. the *Literæ Indulgentiarum Nicholai V.;* it is on a single piece of parchment. This Psalter

was reprinted in 1459, 1490, and 1502, and always in the same type, which, it is remarkable, was never used for any other work, probably because its great size made it unfit for any other works than those not intended for popular reading, but to lay on desks like our church Bibles. On the 16th of October 1459, Fust and Schœffer published the *Durandi Rationale Divinorum Officiorum*, with an entirely new fount of type; in 1460 the *Constitutiones Clementis V.*; and in 1462 the celebrated Latin Bible. Fust enjoyed this successful and glorious practice of his art but ten short years; yet in this period what an immense advance from the misshapen and irregular lumps of their first efforts, ugly in themselves, and more ugly in their utter want of relative proportion and allignement, to the well-proportioned, evenly standing type of the Bible! The plague carried him off in Paris about the year 1466, full of years, and perchance full of honours. Schœffer survived many years, and, in conjunction with Conrad Henlif, produced a great number of works. His name is found in the colophon of the fourth edition of the Bible of 1502, about which time he is supposed to have deceased.

Were we to take tradition for our guide as regards the character of Fust, we should regard him as a conjurer and an adept in the black art. The popular story (and many "grave and discrete old men" have given credit to the tale) runs, that having kept these proceedings profoundly secret, as soon as their Bible was finished, Fust transferred himself to Paris with many copies of the new work, and palmed them upon the learned as manuscripts, to which, as they were printed on vellum, in a type bearing much resemblance to the written books of the period, and the vignettes and initial letters were splendidly illuminated, they were not very

dissimilar; that some eager scholar or devotee became the possessor of the first copy, supposing it to be a rare chance, at the moderate price of four or five hundred crowns; that as he brought the work into the market, the price fell rapidly to sixty, and then to thirty crowns, by which time the extraordinary glut produced suspicion, and Fust was accused of multiplying Holy Writ by the aid of the devil, and was accordingly persecuted by the priesthood, whilst the laity, looking to their temporal interests, prosecuted him for his inroad into their pockets; and that from these things Fust was obliged to quit Paris precipitately. The whole story is an impossible fabrication.

Having thus given a sketch of the origin and history of the art of printing, a brief account of the works issued by the illustrious triumvirate will not only be proper here, but will give the general reader a better idea of the astonishing perfection to which the art rose under the taste and genius of its inventors. There is not a single work of Gutenberg which bears his name; yet, as before remarked, there are several which bear such internal evidences, that the literati of all parties and opinions are unanimous in attributing them to his press.

Of these works, Dr Dibdin, the well-known bibliographer, gives the following account:

"First, as to the *character of the type* used by the early Mentz printers. This appears to have been uniformly what is called *Gothic;* and if we except the varieties of the larger type (from three eighths to two eighths or to a quarter of an inch), which appear in the Psalters of 1457, 1459, and 1490 (the type common to most works executed about the same period), we shall observe three distinct sets or forms of letters used in the printing-office of Faust and Schoiffher.

Of these three typographical characters, two only (if we except the one with which the Bible of 1455 was executed) are visible in the publications which appear to have been printed in the lifetime of Faust; that is to say, the larger Gothic used in the Bible of 1462, and the smaller Gothic in the Offices of Cicero, of the dates of 1465 and 1466. These appeared united, the former, for the first time, in the *Constitutions of Pope Clement V.*, of the date of 1460. Schoiffher introduced a type of an intermediate size, which may be seen, among other works, in the *Rudiments of Grammar* of 1468, and in the *Decretals of Pope Gregory the Ninth*, of the date of 1479. This intermediate type is of a narrower form, and prints very closely. Of the three types here mentioned, the largest is undoubtedly of the handsomest dimensions; but they all partake of the *Secretary Gothic*, and may be said to be the model of that peculiar character which was adopted by the early Leipsic printers, Thanner and Boëttiger, and was more especially used by John Schoiffher and the other German printers for nearly the whole of the sixteenth century. Shew me, Lisardo, one book, nay, one leaf only, printed in the *Roman type*, in the colophon of which the name of Faust or of Peter Schoiffher appears, and you shall immediately have the amount of the balance in my favour, at my banker's, be it great or small, be it L.200 or L.20, for such a precious and unheard-of curiosity.

"We shall now, in the second place, say a few words as to the *character of the printing*, or of the *mechanical skill*, of the early Mentz press. There can be but one opinion upon this point. Everything is perfect of the kind, the paper, the ink, and the register, or regularity of setting up the page. The Bible of the supposed date of 1455 is quite a

miracle in this way;[1] but the Psalters are not less miraculous, nor is less praise due to the *Constitutions of Pope Clement V.*, of the date of 1460, and the *Bible* of 1462; while the *Durandus*, of the earlier date of 1459, exhibiting the first specimen of the smallest letter, strikes one as among the most marvellous monuments extant of the perfection of early typography. Almost all the known works before the year 1462 are printed *upon vellum*, doubtless because they ventured upon limited impressions; and even of the Bible of 1462 more copies have been described upon vellum than upon paper. Upon the whole, the vellum used by Faust and Schoiffher, although inferior to the Venetian, is exceedingly good, being generally both white and substantial.

"In the third place, let us notice the nature or character of the works which have issued from the press of Faust and Schoiffher. Whatever may be our partiality towards that establishment from which the public were first gratified with the sight of a printed book, candour obliges us to confess that the fathers of printing were not fortunate, upon the whole, in the choice of books which issued from their press.

"In the fourth place (for I told you I should be somewhat

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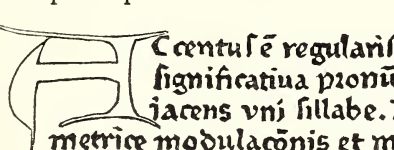
[1] This is even sober praise. The mechanism of the press-work, and appearance of the ink, beautiful, regular, and glossy as the whole appears, does not strike one with more astonishment than the manufacture of the paper. "Charta," says Tungendres, "ejusdem est crassitudinis, qualem illo tempore libris imprimendis consumere mos fuit." And again, "Charta ob ejus densitatem atque spissitudinem haud ingratam ubique se maxime commendat." (*Disq. de Not. Charact. Libror.* p. 27, p. 46.) And see Meerman's testimony in favour of the paper of the Soubiaco press, *Orig. Typog.* vol. i. p. 9, note.

tautologous), consider what is the typographical appearance of those books which Gutenberg is really supposed to have executed. It is quite unique. A little barbarous, and certainly wholly dissimilar from any thing we observe in other contemporaneous productions of the Mentz press. You will please to understand that I think very doubtfully of the *Donatuses,* which are considered to have been printed by him; as well as of the *Speculum Sacerdotum,* and *Celebratio Missarum;* concluding the *Catholicon* of 1460, and the *Vocabularies* of 1467 and 1469, to be the more genuine productions of his press, or of the types used by him. Is it not surprising, I ask, that these works are executed in types quite different from anything we observe in the Mentz productions? and this from a man who is considered as the parent of printing in that city. No wonder, if they *be* the actual productions of Gutenberg, that Faust and Schoiffher thought so meanly of his talents, and that on a dissolution of partnership they adopted a different and a very superior character."

In confirmation of these remarks of the learned bibliographer, we shall here insert a specimen of Gutenberg's *Balbus de Janua,* which will also be a curious illustration of ancient art. Notwithstanding the appearance of these types, the reader is assured that the original is really printed from separate pieces of metal.[1]



[1] The initial A is illuminated in a very brilliant blue. The reader who is desirous of obtaining the full effect of this specimen can fill up the printed outline in water-colour.

Dr Horne, in the appendix to his Introduction to Bibliography, says of the Psalter, "This precious work, as Santander justly calls it, is one of the most known among early printed books, from the various and correct descriptions of it which have been given by different bibliographers. Until the discovery of Pope Nicholas' *Literæ Indulgentiarum*, this was supposed to be the very first article ever printed with a date affixed; the book is executed on vellum, and of such extreme rarity that not more than six or seven copies are known to be in existence; all of which, however, differ from each other in some respect or other. The most perfect copy known is that in the imperial library at Vienna; it comprises 175 leaves, of which the Psalter occupies the 135 first and the recto of the 136th. The remainder is appropriated to the litany, prayers, responses, vigils, &c. The psalms are executed in larger characters than the hymns, similar to those used for missals prior to the invention of printing; but all are distinguished for their uncommon blackness. The capital letters, 288 in number, are cut on wood with a degree of delicacy and boldness which are truly surprising; the largest of these, the initial letters of the psalms, which are black, red, and blue, must (as Lichtenberger has remarked) have passed *three times* through the press. Copies are now in the Queen's library at Windsor, and in that of Earl Spencer at Spencer House." A facsimile of the initial B, and a portion of the first verse of this beautiful book, and of the colophon at the end, will be found in Plate CCCCXIV.

The extraordinary praise awarded by these eminent bibliomaniacs to the first productions of the Mentz press may perchance excite in the minds of the more sober public a suspicion that these writers have been led away by their en-

thusiasm beyond the limits of matter-of-fact truth, and have seen merit in defects, beauty in deformity, and lustre in antiquity. Assuredly, nevertheless, such is by no means the case; and the happy individual who gains access to the *chef-d'œuvres* of Fust and Schœffer will return from the inspection a wiser man; for the beauty of these works is inconceivable. England fortunately possesses several of these treasures of art, there being copies of the Bible of the supposed date of 1450-55 in the Royal Library, in the Bodleian, and in those of Earl Spencer and Sir M. Sykes; whilst of the six known copies of the Psalter of 1457, two are in England, namely, one at Windsor, and one in the possession of Lord Spencer. Of the Latin Bible of Fust and Schœffer, 1462 (the first bearing date), there are copies *on vellum* at Blenheim, in the libraries of Lord Spencer, the Earl of Jersey, and Sir M. Sykes, in the British Museum, and imperfect in the Bodleian. Copies *on paper* are rarer still, there being but three in this country, viz. those in the Royal Library and the British Museum, and one lately in the possession of Mr Willett.

Apparently, in retaliation of the injustice done to Gutenberg by his partners in depriving him of any share of the honour of producing the Psalter of 1457, which, as before stated, must be the joint production of all three, although it was not finished until after the secession of Gutenberg, bibliographers have generally agreed in attributing the printing of the Bible of 1450-55 to Gutenberg alone, when it is equally manifest that Fust and Schœffer had as much claim to the honour as their coadjutor. It is an exceedingly beautiful book, in two very large folio volumes, in two columns, containing from forty-one to forty-three lines

each, in very large well-cut types. It consists of six hundred and forty-one leaves; it has no title, paging, signatures, or catch-words; the initial letters are not printed, but painted in by illuminators, and the initial letters of each verse of the psalms are painted alternately red and black, by way of guide to the priests in their alternate reading. From the lustre and blackness of the ink, its evenness of colour, and beautiful execution, it is a very superb book; but it is nevertheless surpassed by the Fust and Schœffer edition of 1462, when they had attained greater experience in the practice of the art. By far the choicest, however, of these *editiones principes* is the Mentz Psalter or *Codex Psalmorum* before mentioned, the initial B and first few lines of which form part of Plate CCCCXIV. Dr Horne says that the six known copies of this edition differ from each other in some respects, and proceeds to give some particulars in which variations are found; but, upon a comparison of the royal copy with Earl Spencer's, it will be found, that although they bear the same date, they are in fact two distinct editions. It would have excited no great surprise had it been found that the printed ornaments differed, as nothing would be more easy than to change the colours with which the different blocks were worked; but the text varies in such a manner that there can be no doubt of their perfect distinctness. By comparing the following terminations of the lines of the Windsor copy with the specimen, this will be clear. The first line of the Windsor copy ends with abiit; the second with the contracted et; the third with stetit; the fourth with non; the fifth with dni; the sixth with lege. This will be found to arise from a difference in the contractions of the following words:

Windsor Copy.			Earl Spencer's Copy.
First line	q̄	instead of	qui;
Second line,	consilio	instead of	ꝯsilio;
Third line,	pec̄or nō	instead of	pecatorm̄ non;
Fourth line,	ī	instead of	in;
Fifth line,	nō	instead of	non.

These differences arise apparently from the desire of so apportioning the words that each line shall be completely justified out in the Windsor copy, which (as may be seen in the plate) is not the case in Lord Spencer's copy; from which circumstance it is probable that the latter is the earliest. The book[1] is a very large folio, on vellum, consisting of about a hundred and thirty leaves, printed on both sides. There are generally twenty-three lines in a page, in Gothic type. Every psalm begins with a splendid initial letter, about two thirds of the size of the B, *printed* in two colours in almost every case. Occasionally, however, this appears to have been neglected, and then the letter is painted in by the illuminator, but *not* in imitation of the printed letters. The initials consist (like the B) of a bold character, of Gothic cut, surrounded by a scroll, which is sometimes of great length, that of the B extending from the top to the bottom of the page. The same wooden block is used as often as the letter occurs, but it is not always of the same colour; moreover, every *verse* commences with a smaller initial printed in a red colour, in the same manner as the s in the specimen. Nor is this work destitute of the embellishments of the illuminator; for at the commence-

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[1] The copy described is that at Windsor: the illuminations, no doubt, vary in every copy.

ment of every psalm is a rubric, painted in a most brilliant red, in a smaller letter, of precisely the same character as the text, and also the music of the chant, with the words underneath it painted in black. The initial letters of both are splendidly illuminated in various colours. The paint is used in such profusion that the letters are absolutely in relief, often to the extent of one sixteenth of an inch; and besides these, the letter following the grand initial has a broad bar painted down it, and very frequently the first letter after the pauses indicated in our authorized version by a colon is illuminated in a similar manner. One page is particularly splendid; it consists of short verses, in which the first words are constantly repeated. It commences with a grand initial, and there are twenty-two smaller initials to the verses; the second letter of the first verse, and the first letter after every pause (twenty-three in number), having the broad illuminated bar. Wherever the psalm commences too near the bottom to allow of the full exuberance of the scroll, a piece of paper appears to have been laid over a portion of the cut, to prevent the impression from appearing; and in one psalm where the chant is of unusual length, the lower part of the initial O, and a corresponding portion of the scroll, are thus suppressed; the music being illuminated in its place, and the scroll continued below it. Sometimes the illuminator has omitted to add his initial letter; and in this copy the double device is omitted. The accuracy with which the coloured blocks are printed within the text and within each other is perfectly astonishing. From this description it may be conceived how very superb is the *first* book ever printed, the date, and place, and artist of which can be accurately ascertained. Dr Dibdin in the *Bibliotheca Spenceriana*, Mr Savage in his work on *Decorative*

Printing, Dr Horne, whose wood-block is not coloured, and several other writers, have given fac-similes of the same copy (Lord Spencer's), which, however, all differ from one another. The lines given in the specimen in Plate CCCCXIV. are copied from Dibdin, whose initial B does not accord with that of the Windsor copy; the B here given is very accurate, and the colours are as similar as possible to the latter copy, but the colour of the scroll in the original seems somewhat faded.

The capture of the city of Mentz by Count Adolphus of Nassau in the year 1462 had the effect of interrupting the labours of Fust and Schœffer; and moreover the distracted state of the city enabled, perhaps compelled, the workmen initiated in the mysteries of the art to flee into the neighbouring states, and thus spread its practice over the whole civilized globe. Such, indeed, was the fame it had already acquired, and such the idea entertained of its importance, that every community with the slightest pretensions to literature appears to have sought a knowledge of it with the greatest avidity. Thus, within six years of the publication of the Psalter, it had spread to several cities having some connection with Mentz, and within fifteen years to almost every town of consideration in Christian Europe. A chronological list of the cities which first seized upon the invention would be greatly too long for this article; it may be interesting, however, to extract a few of the principal, with a notice of such printers as are remarkable either for the beauty or the scarcity of their works. The reader is not to suppose that all, or indeed any great number of these, learned the practice of the art under the tuition of the first masters. A few are known to have been pupils of the inventors, and it is probable that many others of them were so;

but the majority, in all likelihood, were men of learning, enterprise, or capital, who derived their typographical knowledge from such facts as had transpired, or from inferior workmen of Fust and Schœffer or Gutenberg, supplying deficiencies by their own ingenuity.

Strasbourg. Mentelin. Some writers have claimed for Mentelin the invention of printing, representing that Gutenberg was his servant, without, however, showing the slightest ground for their assertions; but others, more reasonable, say that he was acquainted with Gutenberg, and instructed by him, and that on the latter's quitting Strasbourg he established a printing-office, and carried on the business successfully. Mentelin most probably printed about the year 1458. His type is rude and inelegant. The only book bearing his name is Beauvais' *Speculum Historiale*, of date 1473. Schæpflin says, that he, as well as Fust and Schœffer at Mentz, printed 300 sheets per day.

In 1461. *Bamberg.* Albert Pfister. He printed a collection of *Fables*, of date 1461. This book is excessively rare; it is printed with cast metal type, and is illustrated with 101 wood-cuts, in much the same style as the old *Biblia Pauperum.* All his other works are printed in the same type.

1465. *Subiaco* and *Rome.* Schweynheym and Pannartz. Their known works are, a *Donatus*, without date; Lactantius, 1465; St Augustin on *the City of God*, 1467; Cicero *de Oratore*, without date; and the *Commentary of De Lyra on the Bible*, 1471, all in folio. These works were printed in a new letter, very closely resembling the type now in use called *Roman*, and of which they were the introducers. In *De Lyra* are the earliest specimens of Greek types worthy of the name; some few letters appear in the

Cicero de Officiis printed at Mentz, but so wretchedly imperfect that they are unworthy of mention. It is curious that the Greek fount of Schweynheym and Pannartz at Subiaco was evidently very small; but upon their removal to Rome they cast a much larger fount. The cut and appearance of this Greek is more than respectable. There is a very curious petition from them to the pope, praying for assistance on the ground that they had entirely ruined themselves by printing *De Lyra*, for which there was no sale, and representing that they had on their hands no less than eleven hundred folio volumes of that work. Subiaco is the first place in Italy in which printing was practised. At Rome Ulric Han and Lignamine were contemporaries. Their works, particularly those of Han, are excessively rare.

1467. *Elfield.* Henry and Nicholas Bechtermunze. They purchased from Conrad Humery the types and materials of Gutenberg. Their works are not at all remarkable for beauty, but are very rare, and much sought for as affording evidence of Gutenberg's works.

1467. *Cologne.* Ulric Zell. His type is Gothic, and of no beauty; but his works are rare.

1468. *Augsburg.* Ginther Zainer printed the first book in Germany with Roman type.

1469. *Venice.* John de Spira, whose works are of the utmost beauty. His edition of Pliny is splendid, and enormous sums have been given for those printed in vellum. He did not use Greek characters; but Greek passages are composed in Roman types. In the same city, at the same time, printed Nicholas Jenson, whose works are equal, if not superior, to those of Spira; they are not so rare, but are almost equally sought after. A copy of his folio Latin Bible of 1479, printed in Gothic type, was sold at Mr Edwards' sale

for L.115. 10s. Venice was also the residence of Christopher Valdarfar, whose works gave rise to a most extraordinary event connected with bibliography, viz. the sale of the first edition of *Il Decamerone di Boccaccio,* printed by him in 1471. For many years it had been known that a single copy of this work was in existence, and the most devoted bibliomaniacs had used their utmost endeavours to discover it, but in vain. At length, about 1740, an ancestor of the Duke of Roxburghe obtained possession of it for the sum of one hundred guineas. In lapse of time it became the property of John duke of Roxburghe, the accomplished, indefatigable, and undaunted bibliomaniac, after whose death the gorgeous library was dispersed by the auctioneer in the year 1811. The interest excited amongst the learned by this sale was intense. It was known that the collection contained the most superb specimens of every kind of ancient lore; that the illuminated manuscripts were the most brilliant, the ballads the most obscure, the *editiones principes* the most complete that the world could produce; that the rarest Caxtons, the finest Pynsons, and grandest specimens of the foreign printers, were here to be found; above all, it was rumoured that a mysterious edition of Boccaccio's Decameron would become a bone of contention amongst the noblest of the literati. The public, learned and unlearned, were infected with the mania, and the daily papers teemed with notices of the sale. At length the important day arrived, the 17th of June 1811. St James' Square was the place. Mr Evans presided. The room was crowded; Earl Spencer, the Marquis of Blandford, the Duke of Devonshire, and an agent of Napoleon, were amongst the most prominent. The book was a small folio, in faded yellow morocco binding, black-letter. "Silence followed his (Mr

Evans') address," says Dibdin. " On his right hand, standing against the wall, stood Earl Spencer: a little lower down, and standing at right angles with his lordship, appeared the Marquis of Blandford. The duke, I believe, was not then present; but my Lord Althorpe stood a little backward, to the right of his father Earl Spencer. Such was ' the ground taken up' by the adverse hosts. The honour of firing the first shot was due to a gentleman of Shropshire, unused to this species of warfare, and who seemed to recoil from the reverberation of the report himself had made. ' One hundred guineas,' he exclaimed. Again a pause ensued; but anon the biddings rose rapidly to five hundred guineas. Hitherto, however, it was manifest that the firing was but masked and desultory. At length all random shots ceased, and the champions before named stood gallantly up to each other, resolving not to flinch from a trial of their respective strengths. ' A thousand guineas' were bid by Earl Spencer; to which the marquis added ' ten.' You might have heard a pin drop. All eyes were turned; all breathing well nigh stopped. Every sword was put home within its scabbard, and not a piece of steel was seen to move or to glitter save that which each of these champions brandished in his valorous hand. See, see; they parry, they lunge, they hit; yet their strength is undiminished, and no thought of yielding is entertained by either. ' Two thousand pounds' are offered by the marquis. Then it was that Earl Spencer, as a prudent general, began to think of an useless effusion of blood and expenditure of ammunition, seeing that his adversary was as resolute and fresh as at the onset. For a quarter of a minute he paused, when my Lord Althorpe advanced one step forward, as if to supply his father with another spear for the purpose of renewing the contest. His

countenance was marked with a fixed determination to gain the prize, if prudence in its most commanding form, and with a frown of unusual intensity of expression, had not bade him desist. The father and son for a few seconds converse apart; and the biddings are resumed. 'Two thousand two hundred and fifty pounds,' said Lord Spencer. The spectators are now absolutely electrified. The marquis quietly adds his usual 'ten,' and there is an end of the contest. Mr Evans, ere his hammer fell, made a due pause, and, indeed, as if by something preternatural, the ebony instrument seemed itself to be charmed or suspended 'in mid air.' However, at length down dropped the hammer, and, as Lisardo has not merely poetically expressed himself, 'the echo' of the sound of that fallen hammer 'was heard in the libraries of Rome, of Milan, and Saint Mark.' Not the least surprising incident of this extraordinary sale is, that the marquis already possessed a copy of the work, which wanted a few leaves at the end; he therefore paid this enormous sum for the honour of possessing a few pages. The prize of this contest is now in the possession of Earl Spencer."

1469. *Milan.* Lavagna. In 1476 Dionysius Palavasinus printed the Greek Grammar of Constantine Lascaris, in quarto, which is the first book printed entirely in Greek. The first printing in Hebrew characters was performed at Soncino, in the duchy of Milan, in 1482.

1470. *Paris.* Ulricus Gering, M. Crantz, and M. Friburger.

1471. *Florence.* Bernard Cennini. In 1488 Demetrius of Crete printed the first edition of Homer's works, in most beautiful Greek.

1474. *Basle.* Bernardus Richel.

1474. *Valencia.* Alonzo Fernandes de Cordova.

1474. *Louvain.* Joannes de Westphalia.

1474. *Westminster.* William Caxton, the Game of Chess.

1475. *Lubeck.* Lucas Brandis.

1476. *Antwerp.* Thierry Martins of Alost.

1476. *Pilsen* in Bohemia. *Statuta Synodalia Pragensia;* printer's name not known.

1476. *Delft.* Maurice Yemantz.

1478. *Geneva.* Adam Steinschawer.

1478. *Oxford.* Theodericus Rood.

1480. *St Albans. Laurentii Guillielmi de Saona Rhetorica Nova;* printer's name not known.

1482. *Vienna.* John Winterburg.

1483. *Stockholm.* Johannes Snell.

1483. *Harlem. Formulæ Novitiorum,* by Johannes Andriesson. This is the earliest book printed at Harlem *with a date.* In giving this as the first work *known* to be printed at Harlem, the claims of Koster, his grandsons and successors, must, of course, be reserved.

1493. *Copenhagen.* Gothofridus de Ghemen.

1500. *Cracow.* Joannes Haller.

1500. *Munich.* Joannes Schobzer.

1500. *Amsterdam.* D. Pietersoen.

1507. *Edinburgh.* A Latin Breviary; no printer's name. From a patent of James IV. it appears that the first printing press was established at Edinburgh in 1507. From the style and types, it is probable that they were imported from France.

1551. *Dublin.* Ireland was apparently the last country in Europe into which printing was introduced. The first book printed is a black-letter edition of the Book of Common Prayer, printed by Humphrey Powell.

1569. *Mexico.* Antonio Spinoza, *Vocabulario en Lengua Castellana y Mexicana.*

1639. *United States,* at the town of Cambridge. Printer Stephen Daye.

It was the custom of the early printers to distinguish their books by the most fantastic devices; and by these their works may be readily recognised. Many of them were of exceeding beauty, and all the skill and appliances of their art were employed to render them striking; they are really an ornament to their works. The invention of these has been ascribed to Aldus; but the very first printers, Fust and Schœffer, used each for himself, yet conjoined, devices of rare excellence. Their celebrated Bible is adorned with one which is well worthy of being adopted as the arms of the art and mystery of printing. This is given in the plate of illustrations with those of Caxton, Wynkyn de Worde, and Pierre Regnault, who, with his brother, printed the first English Testament at Paris.

Our chronological arrangement has precluded us from mentioning some of the most skilful typographers. Their works, however, are so numerous, and their efforts so well known, as to render it unnecessary to do more than mention their names. Such men as the Aldi, Frobenius, Plantinus, Operinus, the Stephani, the Elzeviri, the Gryphii, the Giunti, the Moreti, and hosts of peers, have universal fame. The printing-office of Plantinus, in the Place Vendredi, at Antwerp, exists in its full integrity, and in the possession and use of his descendants the Moreti; the same presses, the same types, with the addition of every improvement modern skill has effected, are still in use, and an inspection of these singular relics of olden art will well repay the investigation of the curious.

The First Presses.

Of the mechanical means by which these beautiful impressions of the old printers were produced there is little or no record; but it is quite evident that they must have been effected by some more skilful process than mere manipulation, that is, than the appliance of a burnisher, as is evident in the first wood-cuts, or of a roller, or superficial pressure applied immediately by hand. It is very probable that one of the difficulties which Gutenberg found insuperable at Strasbourg, was the construction of a machine of sufficient power to take impressions of the types or blocks then employed; nor is it at all wonderful that the many years he resided at that city were insufficient to produce the requisite means; for, with cutting type, forming his screws, inventing and making ink, and the means of applying his ink when made, his time must have been amply occupied. Moreover, the construction of a press would require a versatile genius, and excellent mechanical skill, not to be looked for in one man. But upon his junction with Fust and Schœffer, the gold of the former, and the invention of all the three, would soon supply the defect; and, for aught that appears to the contrary, the press used in their office differed in no essential point from those in use until the improvements of Blaew in 1600–20. Fortunately, amongst the queer devices with which it pleased the earlier printers to distinguish their works, Badius Ascensius of Lyons (1495–1535) chose the press; and there are cuts of various sizes on the title-pages of his works. It appears from these, that, like that of Gutenberg, they could print only four pages at a time, and that at two pulls; and when it is stated that the table and tympan ran in, and that the platten was brought

down by a powerful screw, by means of a lever inserted into the spindle, the professional reader will easily recognise the wooden presses laid up in ordinary in many old London houses.

The colour which the earliest typographers used was probably made according to the style of work in hand. The earliest copies of the *Speculum* and *Biblia Pauperum* were printed in a brown colour, of which raw umber is the principal ingredient. It appears to have been well ground and thin. It was, most likely, of the same tint as the old drawings of the same subjects, and would be better adapted for the filling up in various colours, as appears to have been the practice, than a black and harsh outline of ink. Fust and Schœffer, however, introduced, and their followers adopted, black ink, and were so skilful in compounding it that their works present a depth and richness of colour which excites the envy of the moderns; nor has it turned brown, or rendered the surrounding paper in the slightest degree dingy. From the above-mentioned colophons we have also the method of applying it to the types. This was by means of balls of skin stuffed with wool, in every respect the same as those used thirty years ago. The ink was laid in some thickness on a corner of a stone slab, and taken thence in small quantities and ground by a muller, and thence again taken by the balls and applied to the types. The types appear to have been disposed in cases very much the same as ours. The composing-stick differs somewhat, but cannot now be very clearly made out. The different operations of casting the type, composing, reading, and working, are mostly represented in the same apartment; but, it is probable, more for the sake of pictorial unity, than because such was really the custom. There must have been many work-

men engaged in most of the old establishments; and they well knew the value of cleanliness, which is unattainable where all the operations are carried on together.

As the invention of printing has itself become matter of serious controversy amongst the learned of all countries, its introduction into England has not been suffered to pass without an attempt of the novelty-seekers to overturn the received opinion on the subject, and to give to another the laurel of a public benefactor, torn from him to whom the general voice had for two centuries allotted it. Fortunately, the quarrel is divested of one of the great difficulties of the continental, inasmuch as there does not appear to be any vestige of an art in any degree similar (such as block-printing) having been practised prior to the introduction of type-printing; the art, when it was brought over, being in a state somewhat approaching maturity. This controversy concerns the claims of William Caxton and Frederic Corsellis to the introduction of the knowledge of the art, and the printing of the first book, in this country.

The general and original belief is that Caxton, who for thirty years resided in the Low Countries, under the reign of Charles the Bold, and who had taken every opportunity of learning the new art, and had availed himself of the capture of Mentz to secure one of the fugitive workmen of Fust and Schœffer, established a printing-office at Cologne, where he printed the French original and his own translation of the *Recuyell of the Historyes of Troy;* that whilst at Cologne he became acquainted with Wynkyn de Worde, Theoderick Rood, both foreigners, and Thomas Hunte his countryman, who all subsequently became printers in England; that he afterwards transferred his materials to England; that Wynkyn de Worde came over with him, and

probably was the superintendent of his printing establishment; that his first press was established at Westminster, perhaps in one of the chapels attached to the abbey, and certainly under the protection of the abbot; and that he there produced the first book printed in England, the *Game of Chess*, which was completed on the last day of March 1474.

The correctness of these facts is not matter of dispute, all writers agreeing that Caxton did so set up his press at Westminster, and print his *Game of Chess* in 1474; but it has been asserted that Caxton was not the first printer, nor his book the first book printed, in this country. Neither does the controversy rest upon the contradictory statements of many writers, for all authors of the same and succeeding period agree in ascribing the honour to Caxton; and when, in 1642, a dispute arose between the Stationers' Company and certain persons who printed by virtue of a patent from the crown, concerning the validity of this patent, a committee was appointed, who heard evidence for and against the petitioners, and throughout the proceedings Caxton was acknowledged as incontestibly the first printer in England. Thus Caxton seemed to be established as the first English typographer, when, soon after the Restoration, a quarto volume of forty-one leaves was discovered in the library at Cambridge, bearing the title of *Exposicio Sancti Jeronymi in Simbolum Apostolorum ad Papam Laurentium*, and at the end, "Explicit Exposicio Sancti Jeronymi in Simbolo Apostolorum ad papam Laurentium, Oxonie Et finita, Anno Domini M.CCCC.LXVIII. *xvii.* die decembris." Upon the production of this book the claim for priority of printing was set up for Oxford. In the year 1644 Richard Atkyns, who then enjoyed a patent from the

crown, and whose claims consequently brought him into collision with the Stationers' Company, and who was desirous of establishing the prerogative of the sovereign, published a thin quarto work, entitled *The Original and Growth of Printing, collected out of the History and the Records of the Kingdome; wherein is also demonstrated that Printing appertaineth to the Prerogative Royal, and is a Flower of the Crown of England.* The book was published "*by order and appointment of the Right Hon. Mr Secretary Morrice.*" In support of this proposition Atkyns asserted that he had received from an anonymous friend a copy of a manuscript discovered at Lambeth Palace, amongst the archiepiscopal archives. The following is an abstract of this document. "Thomas Bouchier, archbishop of Canterbury, earnestly moved the king, Henry VI. to use all possible means to procure a *printing* mold, to which the king willingly assented, and appropriated to the undertaking the sum of 1500 merks, of which sum Bouchier contributed 300. Mr Turnour, the king's master of the robes, was the person selected to manage the business; and he, taking with him Mr William Caxton, proceeded to Harlem in Holland, where John Guthenberg had recently invented the art, and was himself personally at work; their design being to give a considerable sum to any person who should draw away one of Guthenberg's workmen. With some difficulty they succeeded in purloining one of the under workmen, Frederic Corsellis; and it not being prudent to set him to work in London, he was sent under a guard to Oxford, and there closely watched until he had made good his promise of teaching the secrets of the art. Printing was therefore practised in England before France, Italy, or Germany, which claims priority of Harlem itself, though it is known to be otherwise, that city

gaining the art from the brother of one of the workmen, who had learned it at home of his brother, and afterwards set up for himself at Mentz." The *Exposicio* is asserted by inference to be the work of Corsellis. That this document is a forgery may be safely assumed; because of the more than unsatisfactory manner in which it is said to have been obtained; because no one ever saw this copy; because no one, except the unknown, ever saw the original, for it is not amongst the archives nor in the library of Lambeth Palace, nor was it when the Earl of Pembroke made diligent search for it in 17( ), nor was it found when the manuscripts, books, and muniments were moved into a new building; because Caxton himself, who took so important a share in the alleged abduction of the workman, states that twelve years afterwards he was diligently engaged in learning the art at Strasbourg, and repeatedly ascribes the invention to Gutenberg, "at Mogunce in Almayne;" because, when three years afterwards the Stationers' Company instituted legal proceedings against the University of Cambridge, to restrain them from printing, this document was rejected, as resting only on Atkyns' authority; because Archbishop Parker, in his account of Bourchier, mentions the invention of printing at Mentz, but makes no claim for his having introduced it into England, and Godwin, *de Præsulibus Angliæ*, says that Bourchier, during his primacy of thirty-two years, did nothing remarkable, save giving L.120 for poor scholars, and some books to the university, and that he minutely examined two registers of his proceedings during this term, without making any mention of his having found therein any record of so remarkable a transaction; because, since these transactions must have taken place before 1459, Henry VI. was at that time

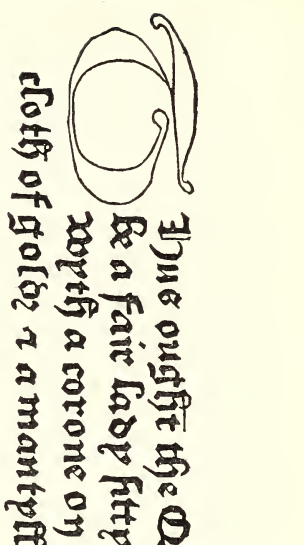
struggling fearfully for his throne and life, Edward IV. being crowned in that year; from internal evidence of the document itself, for, not to mention the weak evidence for the city of Harlem, it is quite certain that Gutenberg never printed there, and by Junius the theft is ascribed to John Fust, who certainly was a rich goldsmith of Mentz; whereupon Meerman, finding these statements at variance with possibility, boldly invents another theory, making the sufferers Koster's grandsons, who never printed, as far as is known, and the robber Corsellis himself; and, lastly, because six years elapsed between this asserted introduction and the publication of his *Exposicio*, and eleven years between this and any other publication from any Oxford press. Although these facts entirely confute the pretensions of Corsellis, there nevertheless remains the book itself, and unless some evidence can be produced, Oxford will still maintain the proud pre-eminence. Some of the most learned bibliographers entirely refuse their assent to the genuineness of the book. Middleton asserts that there must be an error of an x in the imprint, and produces many remarkable instances of similar typographical errors. This, however, is mere assertion; and as, in the Lambeth record, the best evidence is to be sought in the production itself, accordingly the work is printed with *cast* metal types, which are not proved to have been used by Koster at all, that art being invented by Gutenberg, Fust, and Schœffer at Mayence. The letter is of very elegant cut, the pages regular, and the whole work has the appearance of having been executed at a considerably advanced era of the art. Another and a good argument is, that the work has signatures, or marks for the binder at the foot of the page, such not having been used on the continent before 1472, by

John Koethof at Cologne; and it is no refutation of this argument to say, as has been attempted by some, that many works executed by printers who did use signatures are without signatures; for the proof of a negative in one case is the poorest of all possible arguments of a positive in another. Let Caxton, therefore, be replaced in his old niche, the introducer of the art of printing into England.

William Caxton was born about the year 1412, in the Weald of Kent. His father was a wealthy merchant, trading in wool. He was brought up to the business of a mercer, and conducted himself so much to his master's satisfaction, that on his death he bequeathed him the then considerable sum of twenty marks. Caxton then proceeded, probably as the agent of the Mercers' Company, into the Low Countries. He must have been a man of some wealth and consideration, for in 1664 he and Richard Wethenhall were appointed by Edward IV. "ambassadors and special deputies" to continue and confirm a treaty of commerce between him and Philip duke of Burgundy; and, upon the marriage of Edward's sister Margaret with Charles duke of Burgundy, he was appointed to the household retinue of the princess, by whom he appears to have been treated with much familiarity and confidence; for at her instigation he first commenced his literary labours, and he mentions her as repeatedly commanding him to amend his English. His first work was a translation of the *Recuyell of the Historyes of Troye*, which he afterwards printed at Strasbourg, when his leisure had allowed him to turn his attention to the study of printing. The first production of his press is allowed to be the French *Recuyell* above mentioned, his second the *Oracion of John Russell on Charles Duke of Burgundy being created a Knight of the Garter*, which

took place in 1469. Of his transactions between 1471 and 1474 there is no record; probably he was engaged in the diligent pursuit of the art, and preparing to transfer his materials to England, which he accomplished some time before 1477, when we find him printing in or near the Abbey of Westminster, of which Thomas Milling, bishop of Hereford, was at that time abbot. The first production of his English press was the *Game of Chess*, bearing date 1474, which work, however, some assert to have been printed by him at Cologne. We here present a specimen of this famous book, the initial letter being printed in red. His next production was the *Boke of the hoole lyf of Jason;* but his first book bearing date and place in the colophon is the *Dictes and Sayings of Philosophres*, a translation from the French by the gallant Earl Rivers, "at Westmestre, the yere of our lord M. CCCC. lxxvij." From this time he continued both to print and translate with great spirit. His "capital work" was a *Book of the noble Historyes of Kyng Arthur*, in 1485, the most beautiful production of his press.

There is but one copy of any of Cax-



ton's works printed upon vellum; it is the *Doctrinal of Sapyence.* "Translated out of Frensshe in to Englysshe by wyllyam Caxton at Westmestre. Fynyshed the vij day of May the yere of our lord M.CCCC.lxxix. Caxton me fieri fecit." This unique copy is in the library at Windsor, and it is in beautiful preservation. It is moreover doubly unique, for it contains an additional chapter, to be found in no other copy whatever, and which is entitled "Of the negligencies happening in the Masse and of the Remedies. Cap. lxiiij." It is a curious treatise of minute omissions and commissions likely to occur in the service of mass, with directions how to remedy such evils. Of their importance here are two specimens, "If by any negligence fyl (fall) any of the blood of the Sacrament on the *corporas*, or upon any of the vestments, then ought to cut off the piece on which it is fallen, and ought well to be washen, and that piece to be kept with the other relics." "And if the body of Jesu Christ, or any piece, fall upon the palé of the altar, or upon any of the vestments that ben blessed, the piece ought not to be cut off on which it is fallen, but it ought right well to be washen, and the washing to be given to the ministers for to drink, or else drink it himself." This singular treatise finishes with this grave confession, "This chapitre to fore I durst not sett in the booke, by cause it is not convenient ne appertaining that every lay man should know it et cetera." At the usual termination of this work is that colophon of Caxton which is given amongst the illustrations of this article in Plate CCCCXIV.; it is, however, considerably reduced.

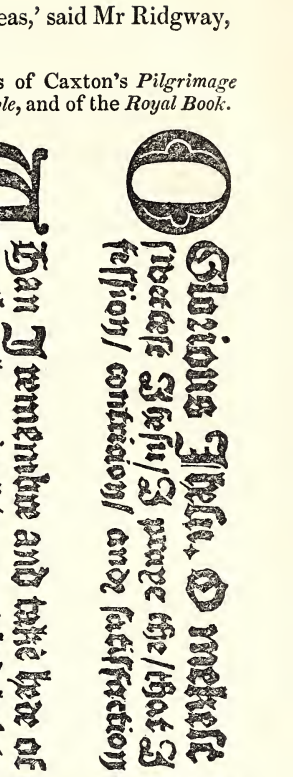
The Royal Library possesses another work of Caxton, which, as a *perfect* copy, is also unique. This is the "Subtyl Historyes and Fables of Esope. Translated out of Frenshe in to Englyshe by Wyllyam Caxton at West-

mynstre In the yere of our lord M CCCC lxxxiij Emprynted by the same the xxvj daye of Marche the yere of our lorde M CCCC lxxxiiij And the fyrste yere of the regne of kyng Rycharde the thyrde." It consists of 142 leaves. Each fable is illustrated by a rude wood-cut, all of which are said to have been executed abroad, where similar editions of Æsop were frequently printed. They are, however, most probably copied; for there is nothing either in their design or execution that a most moderate artist might not perform; and this will equally apply to other wood-cuts interspersed in Caxton's works.

It has been said that the works of Caxton have been eagerly sought for by English bibliomaniacs. The most remarkable instances of this are the enormous prices given for some of them at the sale of the Duke of Roxburghe's library before mentioned. The *Chastysing of God's Children* was knocked down to Earl Spencer for L.146. The *Sessions Papers* were bought for the Society of Lincoln's Inn for L.378. The Duke of Devonshire gave L.351. 15s. for *The Mirrour of the World*, and L.180 for the *Kalendayr of the Shyppers*. Gower's *Confessio Amantis* produced L.366; *The Boke of Chyvalry*, L.336. The *Recuyell of the Historyes of Troye* gave rise to a startling contest. It was the identical copy presented by Caxton to Elizabeth Grey, queen of Edward IV. and sister of his patroness. "Sir Mark Sykes vigorously pushed on his courser till five hundred guineas were bidden; he then reined in the animal, and turned him gently on one side 'toward the green sward.' More hundreds are offered for the beautiful Elizabeth Grey's own copy. The hammer vibrates at nine hundred guineas. The sword of the marquess is in motion, and he makes another thrust—'One

thousand pounds.' 'Let them be guineas,' said Mr Ridgway, and guineas they were. The marquess now recedes. He is determined upon a retreat; another such victory as the one he has just gained (the Valdarfar Boccaccio) must be destruction; and Mr Ridgway bears aloft the beauteous prize in question." (Dibdin.) At Mr Willett's sale *Tullius of Old Age* produced L.210, and became the property of the Duke of Devonshire.

Specimens of Caxton's *Pilgrimage of the Sowle*, and of the *Royal Book*.



Caxton must have been a man of wonderful perseverance and erudition, cultivated and enlarged by an extensive knowledge of books and the world. Of his industry and devotedness some idea may be formed, when Wynkyn de Worde, his successor, states, in his colophon to the *Vitæ Patrum*, that Caxton finished his translation of that work from French into English *on the last day of his life*. He died in 1494, being above fourscore years

of age. His epitaph has been thus written by some friend unknown: "Of your charite pray for the soul of Mayster Willyam Caxton, that in hys tyme was a man of moche ornate and moche renommed wysdome and connynge, and decesed full crystenly the yere of our Lord MCCCCLXXXXI.

Moder of Merci shyld him from thorribul fynd,
And bryng hym to lyff eternal that neuer hath ynd."

The type used by Caxton is in design very inferior to that used upon the Continent even earlier than his period; but in the latter part of his life he very materially improved his founts, and some of his later productions are very elegantly cut. The design is peculiar to him, and is said to be in imitation of his own hand-writing; it bears, however, some resemblance to the types of Ulric Zell, from whom Caxton derived most of his instruction, and is something between *Secretary* and *Gothic*. He appears to have had two founts of *English*, three founts of *Great Primer*, one *Double Pica*, and one *Long Primer*.[1] He used very few ornamented initial letters, and those he did employ are very inferior in elegance to those of foreign printers. He preferred inserting a small capital letter within a large space, and leaving the interval to be filled up according to the taste of the illuminator, owing to which many excellent performances are destitute of these beautiful ornaments. Caxton's ink was not remarkable for depth of colour or richness; his paper was excellent; and he probably used presses of the same construction as the continental printers. His works are not very rare, but are highly prized by English collectors.

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[1] These are terms by which modern English printers distinguish the sizes of their type.

Copies of one or more of his works are to be found in most collections of any pretension, and are well worthy of inspection. The number of his productions is sixty-two. Although Caxton was the first English printer, he was not the only one of his day, Wynkyn de Worde, Lettou and Machlinia, Hunte, Pynson, the Oxford printer whoever he may have been, and he of St Alban's, being his contemporaries.

Wynkyn de Worde came, as we have already seen, from Germany with Caxton, and remained with him in the superintendence of his office until the day of his death, when he succeeded to the business. He was a native of Lorraine, and evidently a man of considerable information and taste, and of great spirit in the conduct of his affairs. After his succession to Caxton's business, he carried it on in the same premises for about six years, when he removed to the " Sygn of the Sonne in flete strete, against the condyth." De Worde appears to have immediately commenced a complete renovation of the art, cutting many new founts of all sizes, with vast improvement of the design and proportion; he moreover provided his contemporaries, then becoming very numerous, with type; and it is even said that some of the letter used by English printers less than a century ago are from his matrices, nay, that the punches are still in existence. He was the first (or Pynson) to introduce Roman letters into England, which he made use of amongst his Gothic to distinguish any thing remarkable, in the same manner as Italic is used in the present day. His works amount to the extraordinary number of four hundred and eight. " His books are, in general, distinguished by neatness and elegance, and are always free from professed immorality. The printer has liberally availed himself of such aid as could be procured from the sister art of engraving;

although it must be confessed that by far the greater, if not the whole, number of wood engravings at this period are of foreign execution; nor is it without a smile that the typographical antiquary discovers the same cut introduced into works of a directly opposite nature."

In his *Instruction for Pilgrims to the Holy Land*, printed in 1523, the text of which is in Roman, and the marginal notes in Italics, he makes the first use in England of Greek, which is in moveable type; of Arabic and Hebrew, which are cut in wood; and the author complains that he is obliged to omit a third part, because the printer had no Hebrew types. Appended to the work are three Latin epistles, in which he makes use of Arabic.

His works are, of course, not so rare as those of his predecessor, but are nevertheless much sought after; and, when sold by the side of the Caxtons at the Duke of Roxburghe's sale, produced large prices. *Bartholomæus de Proprietatibus Rerum*, the first book printed on paper made in England, was bought by the Duke of Devonshire for L.70. 7s. Chaucer's *Troylus and Cresseide*, L.43; Hawys' *Exemple of Vertu*, L.60; *Passetyme of Pleasure*, L.81; *Castell of Pleasure*, L.61; *The Moste Pyteful Hystorye of the Noble Appolyon*, *Kynge of Thyre*, L.110.

De Worde died about the year 1534. In his will, still in the Prerogative Office, dated 5th June 1534, he bequeaths many legacies of books to his friends and servants, with minute directions for payment of small creditors and forgiveness of debtors, betokening a conscientious and kindly disposition. His device is generally that of Caxton, with his own name added to the bottom; but he also used a much more complicated one, consisting of fleurs-de-lis, lions passant, portcullis, harts, roses, and other emblazonments of

the later Plantagenets and the Tudors. A fac-simile of the former will be found in Plate CCCCXIV.

JOHN LETTOU and WILLIAM MACHLINIA printed separately and jointly before the death of Caxton, but were very inferior to him in every respect; their type being most especially barbarous. Their works are not very numerous, and are principally upon legal subjects; they printed the first edition of Lyttleton's Tenures.

RICHARD PYNSON was a Norman by birth, and studied the art of printing under his "worshipful master William Caxton." It would seem that he was an earlier printer than Wynkyn de Worde, having established an office before the death of Caxton. His first work is of date 1493, and was printed "*at the Temple-bar of London.*" He enjoyed high patronage, and was appointed by Henry VII. to be his printer before 1503. He is perhaps inferior to De Worde as a typographer, his first types being extremely rude. He afterwards used a fount of De Worde's, and another peculiar to himself in this country, probably imported from France. Some of his larger works, Fabian's Chronicle, Lord Berner's translation of Froissart (which are the first editions of these important additions to English literature), and some of his law-works, are very fine specimens of the art. His device was a curious compound of R and P, on a shield which is sometimes supported by two naked figures.

Of Julian Notary, William Faques, Henry Pepwell, and others, it is unnecessary even to mention their names, inasmuch as they add little that is interesting to the history of English typography.

RICHARD GRAFTON, however, claims especial notice. He was by trade a grocer, although of good family. Of his education nothing appears; but he was one of the most vo-

luminous authors of his time, having, by his own account, written a considerable portion of Hall's Chronicles, an Abridgment of the Chronicles of England, and a Manual of the same, a Chronicle at Large, and other books of historical character, under what circumstances is not known. In 1537 Grafton published Thomas Mathew's translation of the Bible, which was printed abroad, but where is not satisfactorily ascertained; and in 1538 the Testament translated by Miles Coverdale, which was printed at Paris by Francis Regnault. At this time it would not appear that English printers were in high estimation; for Lord Cromwell, desirous of having the Bible in the English language, thought it necessary to procure from Henry VIII. letters to the king of France for license to print it at Paris, and urged Bonner to tender his earnest assistance. Bonner entered upon the undertaking with such zeal, that in recompense he was soon afterwards appointed to the bishopric of Hereford. Miles Coverdale had charge of the correctness (see his letter, Gent.'s Mag. 1791), and Richard Grafton and Edward Whitchurch were the *proprietors;* but under what arrangement does not appear. When the work was on the point of completion, the Inquisitors of the Faith interfered, seized the sheets, and Grafton, Whitchurch, and Coverdale, were compelled to make precipitate flight. The avarice of the lieutenant-criminal induced him to sell the sheets for waste paper instead of destroying them, and they were in part repurchased. The Testament was intrusted to Francis Regnault, whose brother used the tasteful colophon which will be found in Plate CCCCXIV. Under the protection of Cromwell they next, after many difficulties, obtained their types and other materials from Paris, and the Bible was

completed at London in 1539. "Thus they became printers themselves, which before this affair they never intended." The edition consisted of 2500 copies. Cromwell next procured for them a privilege (not an exclusive one, however) for printing the Scriptures for five years. Very shortly after the death of Lord Cromwell, Grafton was imprisoned for printing Mathew's Bible and the Great Bible, his former friend Bonner much exaggerating the case against him. The prosecution, however, was not followed up; but in a short time he was, with Whitchurch, appointed printer to Prince Edward, with special patents for printing all church-service books and primers. The document is curious. It recites that such "bookes had been prynted by strangiers in other and strange countreys, partely to the great losse and hynderance of our subjects, who both have the sufficient arte, feate and treade of prynting, and partely to the setting forthe the bysshopp of Rome's usurped auctoritie, and keping the same in contynuall memorye;" and that, therefore, of his "grace especiall, he had granted and geven privilege to our wel-biloved subjects Richard Grafton and Edward Whitchurch, citezeins of London," exclusive liberty to print all such books for seven years, upon pain of forfeiture of all such books printed elsewhere.

One Richard Grafton, supposed to be the above, was member of parliament for the city of London in 1553–54, and also in 1556–57, and in 1562 was member for Coventry. He is supposed to have died about 1572, and not in very affluent circumstances. He used a punning, or, as the heralds would call it, a canting device, of a young tree or *graft* growing out of a *tun*. His works are distinguished for their beauty, and are very numerous and costly. He was one of the most careful and meritorious of English printers.

These are the titles of a few of his early Bibles, &c.

The Byble, 1537, folio. " The Byble, which is all the holy Scripture: In whych are contayned the Olde and Newe Testament truly and purely translated into Englysh by Thomas Mathew. Esaye 1 ☞ Hearcken to ye heauens, and thou earth geaue eare: For the Lorde speaketh. M.D.XXXVII." The title of the New Testament is, " The newe Testament of our sauyor Jesu Christ, newly and dylygently translated into Englyshe, with Annotacions in the Mergent to help the Reader to the vnderstandyng of the Texte." This was printed in France.

The New Testament, Latin and English. 1538. Octavo. " The new testament both in Latin and English after the vulgare texte; which is red in the churche. Translated and corrected by Myles Couerdale: and prynted in Paris, by Fraunces Regnault. M. CCCCC. XXXVIII in Nouembre. Prynted for Richard Grafton and Edward Whitchurch. cytezens of London. Cum gratia & priuilegio regis."

The Byble in Englysshe. 1539. Folio. " The Byble in Englyshe, that is to saye the content of all the holy Scrypture, bothe of ye olde, and newe testament, truly translated after the veryte of the Hebrue and Greke textes, by ye dylygent studye of dyuerse excellent learned men, expert in the forsayde tongues. *Prynted by Rychard Grafton, and Edward Whitchurche. Cum priuilegio—solum.* 1539." This is a very superb book, and is the one which was commenced at Paris and finished at London under the circumstances before related.

NEWE TESTAMENT IN ENGLYSSHE. 1540. Quarto. " Translated after the texte of Master Erasmus of Roterodame."

THE PRYMER. English and Latin. 1540. Octavo.

THE BYBLE IN ENGLYSHE. 1540. Folio. A noble volume, called, from the preface, Cranmer's Byble.

THE BYBLE IN ENGLYSHE. 1541. Folio. "The Byble in Englyshe of the largest and greatest volume, auctorised and appoynted by the commaundement of oure moost redoubted prynce and soueraygne Lorde, Kynge Henrye the VIII, supreme head of this his churche and realme of Englande: to be frequented and vsed in euery Churche within this his sayd realme, accordyng to the tenoure of hys former Jniunctions geuen in that behalfe. Ouersene and perused at the comaundemēnt of the kynges hyghnes, by the ryght reuerend fathers in God Cuthbert byshop of Duresme, and Nicholas bisshop of Rochester." The lines of the title are printed alternately red and black.

Such, with many other manuals, primers, &c. were the productions of this most eminent British typographer.

JOHN DAY was a printer of much eminence; and his works are numerous, beautiful, and useful.

The first complete edition of Shakspeare's Plays was printed by ISAAC JAGGARD and EDWARD BLOUNT, in folio, in 1623. Of his single plays, the earliest is "The first part of the Contention betwixt the two famous Houses of Yorke and Lancaster," which was printed by "THOMAS CREED for Thomas Millington, and are to be sold at his shop, under Saint Peter's Church, Cornwall" (Cornhill), in 1594. These plays were printed by various typographers, amongst whom appear the names of George Eld, Valentine Simmes, R. Young, John Robson, and others who only give their initials.

The first edition of Milton's Paradise Lost was printed in quarto by PETER PARKER in the year 1667; the Paradise Regained in 1671.

During the troublesome times that preceded the great rebellion, the Puritans, jealously watched and persecuted, introduced the anomaly of ambulatory presses, which were constantly removed from town to town to escape the vigilance of the Star-Chamber. At these presses many of Milton's controversial pamphlets were printed; and it is even said that the identical press at which the Areopagitica was printed is still in existence, and was lately in the possession of Mr Valpy, the well-known printer of the Variorum Classics.

It is a very pleasing reflection, that the earlier practitioners of the art did, by their uniform good character and religious turn, tend much to render their profession productive of a highly moral class of literature, and to raise it in the estimation of all men. Had they been less respectable, had they turned their attention to the many ribald and tasteless writings of those times, the effect of the new art would have been to degrade literature and lower morals, to delay the spread of knowledge, and to give a depression to the character of the art and its practitioners, from which possibly they might never have recovered. These excellent and learned men appear to have received their temporal reward, in public estimation, sufficient wealth, and a length of years beyond the ordinary term of mortality.

Setting aside the claim of Corsellis, printing was first practised at Oxford by Theoderic Rood and Thomas Hunte from 1480 to 1485. In Rymer, vol. xv. is a grant by Queen Elizabeth to Thomas Cooper, clerk of Oxford, for the exclusive printing of his Latin Dictionary. In 1585 a printing press was established at the expense of the Earl of Leicester, chancellor of the university. Joseph Barnes was appointed printer to the university in 1585.

At CAMBRIDGE John Siberch printed in 1521, when Erasmus resided there, and probably executed some of his books. Thomas Thomas, M. A. was the first printer to the university in 1584.

At ST ALBAN'S printing was very early practised, certainly in the year 1480. It would appear that the printer was a schoolmaster. It has been asserted, but without shadow of argument, that printing was introduced here many years before Caxton.

Printing was not introduced into Scotland till thirty years after Caxton had set up his press at Westminster. Under the patronage of James IV., who was a zealous encourager of learning and the useful arts, WALTER CHEPMAN and ANDRO MYLLAR established the first printing press at Edinburgh, as appears by a royal privilege granted to them in 1507.[1]

The only publications known to have issued from the

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[1] "James, &c. To al and sindrj our officiaris liegis and subdittis quham it efferis, quhais knawlage thir our lettres salcum, greting; Wit ye that forsamekill as our lovittis servitouris Walter Chepman and Andro Millar, burgessis of our burgh of Edinburgh, has at our instance and request, for our plesour, the honour and proffit of our Realm and liegis, takin on them to furnis and bring hame ane prent, with all stuff belangand tharto, and expert men to use the samyne, for imprenting within our Realme of the bukis of our Lawis, actis of parliament, croniclis, mess bukis, and portuus efter the use of our Realme, with addicions and legendis of Scottis sanctis, now gaderit to be ekit tharto, and al utheris bukis that salbe sene necessar, and to sel the sammyn for competent pricis, be our avis and discrecioun thair labouris and expens being considerit," &c.

"Geven under our prive Sel at Edinburgh the xv day of September, and of our Regne the xx^ti yer."

press of Myllar and Chepman are a collection of pamphlets, chiefly metrical romances and ballads, in 1508, of which an imperfect copy is preserved in the Advocates' Library;[1] and the Scottish Service Book, including the Legends of the Scottish Saints, commonly called the Breviary of Aberdeen, in 1509.[2]

It is difficult to account for the discontinuance of printing in Scotland for about twenty years after this time: probably the disastrous events at the close of the reign of James IV. may have contributed to render it an unprofitable trade; but in its revival by DAVIDSON there was no deterioration, either in the magnitude and importance of the works attempted, or in the mode in which the mechanical part was executed. It was probably about the year 1536 that he printed, in a black-letter folio, "The History and Croniklis of Scotland, compilit and newly correckit be the Reuerend and Noble Clerke Maister Hector Boece. Translatit laitly be Maister Johne Bellenden. Imprentit in Edinburgh be Thomas Davidson, dwelling fornent the Frere Wynd;" and in 1540 he printed the whole works of Sir David Lindsay.

Davidson was succeeded by Lekprevik, Vautrollier, and

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[1] These pamphlets were reprinted in a handsome quarto volume, edited by Mr David Laing. The preface contains much accurate information regarding early printing in Scotland.

[2] Of this Service Book, which forms two volumes octavo, handsomely printed with red and black letter, in the years 1509 and 1510, a beautiful copy is preserved in the University Library of Edinburgh. As the name and device of Walter Chepman occur in the work, without any mention being made of his partner, we are led to the conclusion that Andro Myllar, if then alive, had relinquished his share in the concern.

others; but none were distinguished as printers till the time of Ruddiman.

A mere catalogue of printers would afford little amusement, and less instruction; especially since the productions of the English press, save in the works of the printers above named, not only exhibited no advance, but even much deterioration, in most requisites of good printing. Indeed, to so low a point had the art fallen, and so little spirit was exhibited by English typographers, that the regeneration was left to an alien, whose perception of the inferiority and capacity of improvement at once raised the art to the level of the finest productions of Bodoni and Barbou.

This was JOHN BASKERVILLE, a japanner of Birmingham, who, having realized a considerable fortune, turned his attention to cutting punches for type, and succeeded in producing a series of founts of remarkable beauty, so excellently proportioned, and standing so well, that the best of modern type-founders (and this seems the Augustan age of type-founding) have done no more than vary the proportions and refine the more delicate lines and strokes. Added to this, his press-work is of most excellent quality; his paper the choicest that could be procured; and his ink has a richness of tone, the mode of producing which has died with him. The works of Baskerville are amongst the choicest that can adorn a library. He died in 1775. His types and punches were purchased to print the splendid edition of Voltaire's works at Paris. He was worthily succeeded by BULMER, whose magnificent Shakspeare and MILTON are amongst the most superb books ever issued from the press, and, with Macklin's Bible and Ritchie's, Bensly's Hume, and other works, may be fearlessly produced to win for this country the palm of fine printing; whilst in Scot-

land THOMAS RUDDIMAN, and the two FOULIS, may challenge the prize of classical typography from Aldus and the Stephani. Indeed the larger Greek types of the Foulis are without parallel for grandeur; their press-work is beautiful, and their correctness beyond all praise.

Modern printers, with all their faults, are not degenerate successors of these worthies. The works from present offices that make pretensions to fine printing need not be ashamed of comparison with these *chef-d'œuvres;* whilst, from the vast improvements in the mechanism of the art in all its branches, paper, presses, ink, type, and other adjuncts, the average of the printing of the present day is infinitely superior to that of the last century. But in what relates to practical skill, correctness, taste, and diligence, we cannot hope to excel, though we may perhaps equal, these departed masters.

PRACTICAL PRINTING.

THE first operation when the new fount[1] has entered the doors of the printing-office, is to *lay* it in the *cases*. (See Plate CCCCXV.) These are always in pairs, the *upper case* being divided into equal spaces or *boxes;* the part on the left of the broader division being appropriated to CAPITAL letters, figures, accented letters, particular *sorts*, &c.; that on the right to SMALL CAPITALS and miscellaneous characters. The letters and figures are arranged in alphabetical and numerical order, from left to right. The *lower case* is divided into unequal portions, according to the average occurrence of the particular letters; for the compositor (the workman whose duty it is to lay the fount, and afterwards to place together or *compose* the separate types into words) never looks at the face of the letter he picks up, but unhesitatingly plunges his fingers into any box, being sure that the letter he picks out thence is the one to which that box is appropriated, and consequently the one he requires. As there is no external mark or guide attached to the different boxes to denote the

[1] A fount is any weight of type consisting of every letter, space, quadrat, &c. in certain proportions, instances of which are given below. See TYPE-FOUNDING.

letters they contain, a stranger is not a little surprised and mystified at the eccentric movements of the workman's hand. Accordingly, it will be observed, upon looking to the engraving, that the letter e has a box one half larger than any other, c, d, m, n, h, u, t, i, s, o, a, r, twice the size of b, l, v, k, f, g, y, p, or w, and four times the size of z, x, j, q, or the [] crotchets, full points, &c. These boxes are not arranged in alphabetical or any other order, but as experience has shown how the case may be most conveniently divided into the requisite proportions. There are also other pairs of cases similarly arranged for the *italic* letters. The fount is therefore *laid* or distributed in these boxes, when the following are found to be some of the proportions of the letters in a fount of pica of 800 lbs. weight:

Capitals, of each from 400 to 600,
Small capitals, from 150 to 300,

a	8,500,	b	1,600,	j	400,	z	200,
e	12,000,	c	3,000,	k	800,	&	200,
i	8,000,	d	4,000,	m	3,000,	,	4,500,
o	8,000,	f	2,500,	n	8,000,	.	2,000,
u	3,400,	h	6,400,	q	500,		

the whole fount comprehending the number of 150,000 letters, spaces, and figures.

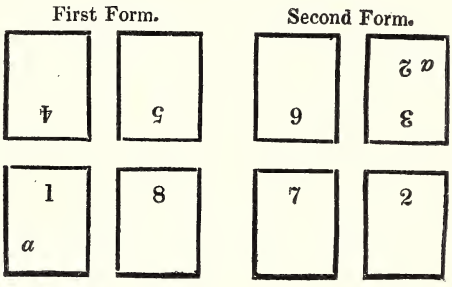
The compositor having placed his copy upon a little-used part of the upper case, and having received the necessary directions, takes up an instrument called a *composing-stick* (which, as well as the way of holding it and its use, will be better understood by reference to the drawing than by description, see Plate CCCCXV.), and sliding that inner moveable portion fastened by a screw, wider or closer according to the desired width of the page, cuts to the exact size a piece of brass rule, called the *setting-rule*,

which enables the letters to slip down without any obstruction from the screw-holes of the stick, or the nicks by which one fount is distinguished from another. He then reads the first few words of his copy, takes first a capital letter from the upper case, the succeeding letters from the lower case, and at the conclusion of the word a *space*, which is merely the shank of a letter without any face, and not so high as a letter by about one-fourth part. This therefore separates each word by a space, which cannot appear upon the paper, because the ink cannot be distributed upon it except by mismanagement, in which case it is a fearful blotch upon a fair page, and must have been observed by most readers. He then proceeds with his next word, which will probably consist of lower-case letters only, and so proceeds until he has arrived at the end of his line. It is most likely, however, that the words he has occasion to compose, with the necessary spaces, will not fill up the exact width of the line, and that there will be sometimes too much, sometimes too little, room for getting in the next or part of the next word. In this case he has to consider whether it will be better to crowd the line and get in the next syllable, or make the line more open and take it over to the next line; his care being that his matter, when composed, shall not look too white or too dark. Having decided, he takes out the spaces he has inserted, and puts in their stead others of greater or less width, as the case may require, in such a manner that on the face of the line being touched it shall not feel loose, or that it shall not require any particular pressure to force down the last letter into its proper place. This being accomplished in an artist-like manner, he takes out his setting-rule, and places it in front of his line, and with a gentle pressure of the thumb forces both back in-

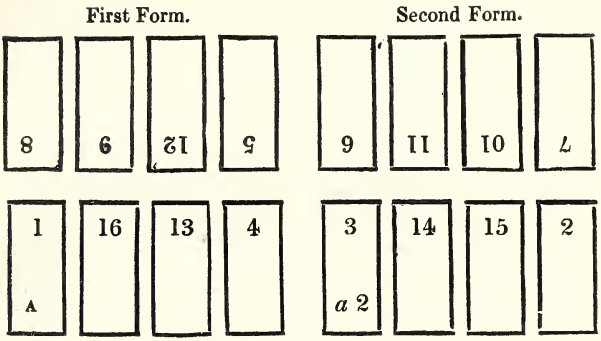
to the composing-stick; he then proceeds in a similar manner with other lines, until his stick is very nearly full, when, placing it upon the *frame* on which the cases are, his setting-rule being in front, he lifts his lines out of the stick in order to place them upon a proper instrument, called a *galley*. If, however, the matter is to be *leaded*, that is, if the lines of types are to be more apart than usual, the process is a little different. The compositor then has before him a quantity of pieces of metal called *leads*, of the exact width of the page, only one fourth, one sixth, or one eighth as wide as the type, and not higher than spaces. After composing a line, before moving his setting-rule, he takes one or more of these and places it before the line, then places the setting-rule, and so proceeds. Having thus gone on until a considerable quantity of matter is composed, the compositor next proceeds to make it up into pages, and then into sheets. First, taking by portions as many lines of his matter as are to be contained in a page, he adds thereto at the bottom a line of quadrats, which are the same as spaces, but much larger, being three, four, five, or six times as long as they are broad, and places at the top the folio of the page and the *running head*, or line which indicates the title of the work or the subject of the page or chapter, and then adds such leads or other things as may be necessary, taking care that in the first page he places the *signature* (a letter of the alphabet, intended for a guide to the binder), because by keeping this always outside, and the second signature on the next leaf, he cannot fold the sheet wrong. He next ties it tightly round with page-cord, and places it upon a piece of coarse paper. Having made up as many pages as the sheet consists of, viz. four if folio, eight if 4to, sixteen if 8vo, he next lays them down upon the *im-*

posing-stone (a large slab of marble let into a frame) in the necessary order. This is, to a stranger, a very curious arrangement; they appear to him to be placed at random, without any design or fixed rule, and as they are necessarily laid down in two divisions, one for each side of the sheet, one is of consequence the very reverse of the other. He may very easily instruct himself, however; for if he take a sheet of paper, and fold it into any required size, marking the folios with a pencil, and then open it without cutting, he will find they fall in curious irregularity. The pages are laid down on the stone reverse of the arrangement they have on the paper; for it must be remembered that every type and every page is like a seal, the reverse of the impression it leaves; consequently, were the pages laid down as on a marked paper, viz. the first page on the right hand, it would, in type, be at the extreme left, and so on. The following schemes of the *laying down* and *imposition* of a sheet of 4to, 8vo, 12mo, and 18mo, will give some idea of the apparent confusion of this process.

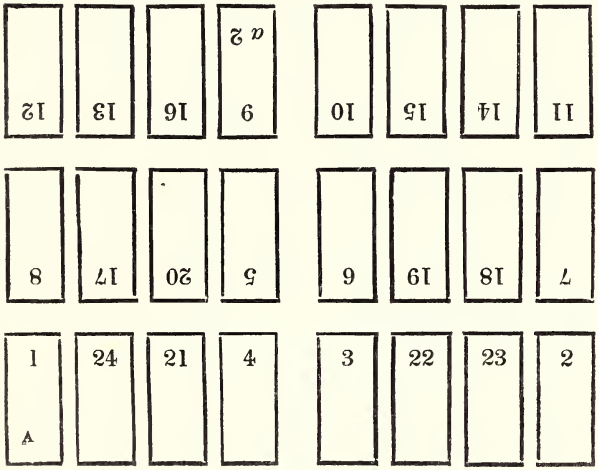
Imposition of a Sheet of 4to.



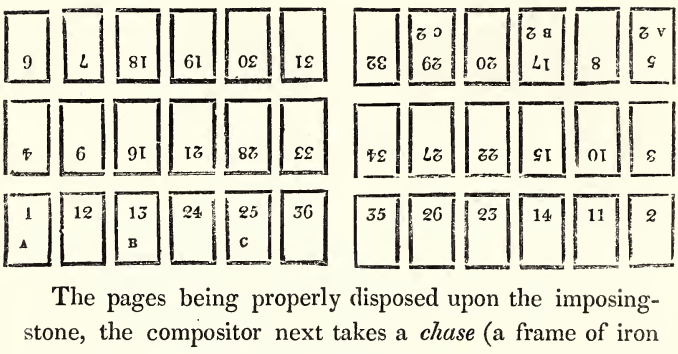
Imposition of a Sheet of 8*vo.*



Imposition of a Sheet of 12*mo.*



Imposition of a Sheet of 18*mo.*



The pages being properly disposed upon the imposing-stone, the compositor next takes a *chase* (a frame of iron divided by cross bars into compartments, the inner angles of which are made rectangular with much care) and places it over them, and then having ascertained the size of the paper to be used, adjusts pieces of wood or metal, called furniture, between them. Within the chase, but next to the pages, he now places other pieces of iron called *side* and *foot sticks*, which are rather wider at one end than the other, and between these and the chase small pieces of wood, which decrease in width in the same proportion as the side-stick, and which are called *quoins*. With a *shooting-stick* (which formidably-named weapon is merely a piece of hard wood, a foot in length, an inch and a half in width, and half an inch in thickness) and a mallet he forces the quoins towards the thicker ends of the side and foot sticks, which consequently act as gradual and most powerful wedges, forcing the separate pieces of type to become a compact and almost united body, so that, every side of the pages being again and again *locked up*, the whole mass, consisting of many thousand letters, may be lifted unbroken from the stone. This united mass is called a *form;* that one which

contains the first page being called the *outer form*, the other the *inner*.

The compositor is paid by the number of thousands of letters he composes, which is thus ascertained. The letter m, being on a shank which is perfectly square, is taken as the standard; he ascertains how many ms the page is in length, including the running head and the white line at the bottom; that is, in fact, how many lines of the particular type used there would be in a page of the given size, supposing it were all solid type; next, how many ms it is in width, that is, how many times the letter m would be repeated in a line of the given length were it to consist of nothing but ms. This latter sum is then doubled, because experience shows that the average width of the letters is one half of the depth, or one half of that of the letter m. The length of the page is then multiplied by the product of this doubled width, then by the number of pages in the sheet, and the result will give the average number of letters in the sheet. This will be much better understood by the following *casting up* of a sheet of 8vo in pica.

Number of ms long.....47
... ms wide, 24 × 2.....48

376
188

2256
Number of pages in a sheet of 8vo..... 16

13536
2256

36096

The compositor therefore is paid for composing 36,000 letters; for odd figures are dropped, unless they exceed 500, when they are paid for as if they completed another 1000. If the sheet be of solid type, and of ordinary size, the price paid in London is sixpence per 1000 letters; if the small type called minion, sixpence farthing; if nonpareil, sevenpence; if pearl, eightpence. If, however, the type be leaded, the price is a farthing per 1000 less; and if the work be composed from print copy, the price is three farthings per 1000 less than it would be paid if the copy were manuscript. Works in foreign languages are paid one halfpenny per 1000 more in the type of ordinary size, three farthings per 1000 more in the smaller. Greek with leads and without accents is eightpence halfpenny per 1000; without leads or accents, eightpence three farthings; with accents, tenpence farthing. Hebrew, Arabic, Syriac, &c. are paid double.[1] The compositor, it appears, must therefore pick up 72,000 letters before he can receive an ordinary

[1] In 1804, after a protracted litigation before the Court of Session, the journeymen compositors of Edinburgh succeeded in obtaining the sanction of the Court for an advance of one penny per thousand letters, or, upon an average, about one fourth on the prices of their work. The grounds upon which the Court rested this decision were, that the wages were much too low; that they had remained for forty years unaltered, whilst the price of the necessaries of life had very much increased; that although it was proper to avoid a rise of wages which might lead to idleness, yet it was equally necessary to place the workmen upon a respectable footing, so as to enable them to do their work properly, and also to encourage them in cultivating and acquiring that degree of literature by which the public must infallibly be benefited; and that the fair criterion was, to make the wages of Edinburgh bear the same proportion to

week's wages, must moreover correct all the blunders mischance or carelessness may have occasioned; and must make up his matter into pages and impose them, with great expenditure of time in many other particulars; but, as is hereafter described, he must have previously placed every one of these 72,000 into the appropriate boxes whence he has withdrawn them in composition. Now it is usually reckoned that this latter operation, called *distributing*, occupies one fourth of a compositor's time, and the other operations another fourth; he has therefore only one half of his time for composition; consequently he must pick up letters at the rate of 144,000 per week, 24,000 per day, or 2000 per hour. His hand has in picking up each letter to traverse a considerable space, say six inches, and back again, to his composing-stick. His rapidity of motion is therefore wonderful, and the exertion is so long continued, that the business, although apparently a light one, is in fact extremely laborious. The number of thousands of letters in a sheet necessarily varies with the size of the type, width and length of the page, and the number of the pages. The casting up

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those of London which they did in the year 1785, before the London prices were raised.

That a court of law, whose province it is, not to legislate, but to apply and enforce existing statutes, should have entertained a question regarding the price of labour, for the regulation of which there not only existed no law, but which had never been deemed a fit subject for legislative interference, appears to be a very singular incident in the history of judicial procedure. The prices thus fixed, however (namely, 4½d. per 1000 for book-work, with an additional halfpenny if nonpareil, and a penny if pearl, and 5½d. for law-papers and jobs), being regarded as not unreasonable, have ever since been adhered to by every respectable establishment in Edinburgh.

above given is a solid pica sheet of demy octavo, of moderate page; a similar sheet of brevier would contain 81,000 letters, and the cost of composing it would be L.2. 0s. 6d. Single tables, forming one uninterrupted mass of type, will sometimes contain 250,000 letters; and the labour of the compositor being very great in getting up tables, he is paid double. Consequently the cost of composing such a table in pearl or diamond (see the 13th of Bell's Chronological Tables, 4th edit.) would be not less than L.16. 13s. 6d., without extra charges. Yet this infinity of types, by the power of the wedge-formed side-sticks and quoins, is formed into so solid a mass as to be moved without much danger of disruption.

The sheet being now imposed, an impression is taken, called a proof, which is carried down to the reader, who, having folded the proof in the necessary manner, first looks over the signatures, next ascertains whether the sheet commences with the right signature and folio, and then looks to the following folios. He now looks over the running heads, inspects the proof to see that it has been imposed in the proper furniture, that the chapters are numbered rightly, and that the other directions have been correctly attended to, marking whatever he finds wrong. Having carefully done this, he places the proof before him, with the copy at his left hand, and proceeds to read the proof over with the greatest minuteness, referring incessantly to the copy that no word may escape him, correcting the capitals or italics, or any other peculiarities, noting continually whether every portion of the composition has been executed in a workman-like manner; and having fully satisfied himself upon all technical points, he calls his reading-boy, who, taking the copy, reads in a clear voice, but with great rapidity and the

least possible attention to sound, sense, pauses, or cadences, the precise words placed before him, inserting, without pause or embarrassment, from the most crabbed or intricate copy, every interlineation, note, or side-note. The gabble of these boys in a reading-room, where there are three or four reading, is most amusing, a stranger hearing the utmost confusion of tongues, strange unconnected sentences, and most monotonous tones; the readers plodding at their several tasks with the most iron composure, not in the least disturbed by the Babel around them. They follow carefully every word, marking every error, or pausing to assist in deciphering every unknown or foreign word. This first reading is strictly confined to making the proof an exact copy of the manuscript, and ascertaining the competency of the compositor, consequently first readers are generally intelligent and well-educated compositors, whose practical knowledge enables them to detect the most trivial technical deficiencies. Having thus a second time perused the proof, and carefully marked upon the copy the commencement, signature, and folio of the succeeding sheet, he sends it by his reading-boy to the composing-room to be corrected by the workmen who have taken share in the composition. These immediately divide the proof amongst them, and each, taking that portion of it which contains the matter he had composed, and going to his cases, gathers the letters marked as corrections in the margin, together with a quantity of spaces of all sizes, and returns to the forms, which in the meanwhile one of them has *laid up* on the imposing-stones and unlocked. He then with a blunt bodkin lifts up each line in which a correction is required, draws out the wrong letter and inserts the right one, adjusting the spaces in such a way as to compensate for the increased or diminished

size of the letter substituted, overrunning carefully several lines should any word have been added or struck out, so that the spacing may be uniform, and the corrected matter exhibit no proof whatever of any alteration having been necessary. This is an operation requiring much practice and skill; and here is shown the value of attention in the preliminary operations. Should the types have been carelessly laid or improperly distributed, should the workman have been careless in composition, capitalling, or spacing, he will consume as much time in amending his errors as in composing his matter, to the great detriment of his work, the injury and inconvenience of his employer and his companions, and great delay in every part of the printing-office. Thus every compositor having taken his share, another proof is pulled, which, with the original proof, is taken to the same first reader, who compares the one with the other, and ascertains that his marks have been carefully attended to, in default of which, he again sends it up to be corrected; but should he find his revision satisfactory, he sends the second proof with the copy to the second reader, by whom it undergoes the same careful inspection; but this time, most technical objections being rectified, the reader observes whether the author's language be good and intelligible; if not, he makes such queries on the margin as his experience may suggest; and having again followed his reading-boy, he sends it up to the compositor, where it again undergoes correction, and a proof being very carefully pulled, it is sent down to the same reader, who revises his marks and transfers the queries. The proof is then sent, generally with the copy, to the author for his perusal, and he having made such alterations as he thinks necessary, sends it back to the printing-office for correction. With the proper attention to these

marks the printer's responsibility as to correctness ceases, and the sheet is now ready for press.

It need scarcely be remarked, that " correctness of the press" is a very material feature in every work, and more especially in those of a scientific nature. When the attention and the mind are devoted to the train of some close argument, or passage of surpassing beauty, it is surprising how easily an error of the press, even although it may not injure the sense, and may be as evident " as the sun at noon," will destroy the charm, and break the " thread of the discourse ;" and even in works of ordinary reading they are exceedingly offensive. Many curious anecdotes are related of the methods which the earlier printers adopted to attain correctness. It was the glory of the early literati to take charge of the accuracy of new works ; and, in return, the value and sale of each edition varied with the skill and reputation of the corrector. Of these Erasmus is an illustrious proof. Many of the first printers were led to the practice of the art by their love of learning, and their anxiety to promote it by the production of classic authors. Hence several are better known in the world of learning than in the circle of bibliographers ; as the editors and correctors of valuable works, than as the careful or beautiful printers of them. Aldus, it is true, has so admirably succeeded in both characters, that he has fully established his double fame ; but whether he most valued himself upon his learning or his skill may be doubted. It would appear from his letters that he considered it as his chiefest duty to correct every sheet that passed through his press. In all his bustle in preparing every material in use in his art, in all his occupations public and private, this important duty was never neglected. He tells us, " that he has hardly

time to inspect, much less to correct, the sheets which are executed in his office; that his days and his nights are devoted to the preparation of fit materials; and that he can scarcely take food or strengthen his stomach, owing to the multiplicity and pressure of business; meanwhile," adds he, " with both hands occupied, and surrounded by pressmen who are clamorous for work, there is scarcely time even to blow one's nose;" nor did his son or grandson depart from his ways, but did themselves insure the correctness of their works, even when the latter had risen to wealth and eminence, and enjoyed the laborious dignity of a professor's chair. The beautiful Greek works of the Stephani are especially valued for their correctness. Stephens corrected his own press with intense labour and minuteness, and is reported to have adopted a singular plan for obtaining perfect similarity to the copy, by employing females who had not the slightest knowledge of the Greek characters or language to compare every letter of the proof with the manuscript; a labour so intense as to be almost incredible. He is moreover said to have hung up proofs on the doors of his printing-office, and to have amply rewarded any who could detect inaccuracies therein. Coverdale, it will be recollected, corrected the first English Bible and Testament, and received a bishopric as his reward.

The experience of every printer will furnish a host of laughable errors; and indeed these defects have been deemed of such importance as to deserve preservation. (D'Israeli's *Curiosities of Literature.*) The omission of the word *not* from the seventh commandment, in an edition of the Bible, printed by the Stationers' Company, is well known; and the company richly deserved the severe fine they incurred for spreading the immoral command, " Thou shalt commit adultery." The

Bible so misprinted has received the name of the "Adultery Bible;" and a copy is preserved in the British Museum, the edition having been carefully suppressed. There is another Bible known as the "Vinegar Bible," from a misprint in the 20th chapter of St Luke, where "Parable of the Vinegar" is printed for "Parable of the Vineyard;" this proceeded from the Clarendon press. In the reign of Charles I. a very curious traffic in Bibles, &c. arose; they were printed by any one who chose, and imported in vast numbers from abroad. It will readily be imagined that these were made for *sale*, not for *use*, and that they abounded with egregious errors; but, what is worse than this, they were full of mistranslations and interpolations, and the omissions were fearful. All these were done as much by design as by accident, the Romanists and sectaries taking the opportunity of advancing their own tenets by interpolating and altering texts to suit their views. These monstrous anomalies produced, however, some good; they occasioned the necessity of the authorized version now in use, and printed under such authority as insures perfect fidelity, whilst there is sufficient competition to make it impossible that the Word of God can ever become a sealed book to the humblest and poorest Christian. Some of the blunders in these editions are sufficiently absurd to overcome the repugnance which must naturally be felt at such license. Thus, in Luke xxi. 28, *condemnation* has been misprinted for *redemption*. In Field's Bible of 1653, called the Pearl Bible, Rom. vi. 13, we find "Neither yield ye your members as instruments of *righteousness* unto sin," for *unrighteousness;* and 1 Cor. vi. 9, "Know ye not that the unrighteous *shall inherit* the kingdom of God?" for *shall not inherit*. It is said that these corruptions are in great measure owing to Field's cupidity, and that he received a

bribe of L.1500 from the Independents to alter the text in Acts vi. 3, to sanction the right of the people to appoint their own pastors, "Wherefore, brethren, look ye out among you seven men of honest report, full of the Holy Ghost and wisdom, whom *ye* may appoint over this business," instead of *we*. This Bible is notorious, and, strange to say, valued, for its gross incorrectness. It is asserted that no less than six thousand errors of greater or less magnitude have been noted in it. But the most extraordinary example of carelessness is presented by the Vulgate the printing of which was sedulously superintended by no less an authority than Sextus V., a curious example of the infallibility of the pope. To the astonishment of the world, it swarmed with errors; and a whimsical attempt was made to remedy the defects, by pasting printed slips of paper over the erroneous passages. As this, however, was exceedingly laughable, the papal authority was exerted to the utmost to call in the edition, and with such effect, that it soon became very scarce, and a copy of it has produced the disproportionate sum of sixty guineas. To add to the absurdity, the volume contains a bull from the pope anathematising and excommunicating all printers who, in reprinting it, should make any alteration in the text. The monkish editor of *The Anatomy of the Mass*, printed in 1561, a work consisting of 172 pages of text and fifteen pages of errata, very amusingly accounts for these mistakes by attributing them to the artifice of Satan, who caused the printers to commit such numerous blunders; but he does not inform us whether it was really the archangel fallen, or only his minor satellite, the printer's devil. The editor of an Ethiopic version of St Paul's Epistles innocently confesses, in palliation of his errors, "that they who printed the work could not read, and we could

not print: they helped us and we helped them, as the blind helps the blind."

The sheet being printed off in the way hereafter to be described, and the forms returned by the pressmen to the composing-room, and very carefully washed with lye, and rinsed with water, the compositor lays up the forms on a letter-board, and there unlocks them. Each compositor employed on the work then takes a share of the letter, and, wetting the face of it plentifully with a sponge, which causes the types to adhere sufficiently to prevent accidents, yet not so much as to retard the workman, takes up a portion on his setting-rule, with the nick upwards, and the face turned towards him; he then takes between his fingers and thumb a few letters, gives a rapid glance at the face to see what letters they are, and then passing his hand rapidly over the cases, drops each into its appropriate box. In this operation the greatest attention is necessary, for it must be remembered, that every letter dropped into a wrong box in distributing is sure to cause an error in composing; for the workman, as before stated, never looks at the letter he takes up, relying upon the correctness of the distribution. Compositors, therefore, should be especially careful, when learning their business, not to sacrifice certainty to swiftness; for in this instance most especially is it found that too much haste is little speed. If the rapidity of motion in composition strikes the stranger with wonder, what must that of distribution occasion? Most compositors distribute four times as rapidly as they compose; if, therefore, he pick up two thousand letters in an hour, he would distribute eight or ten thousand, or about three per second. His letter being properly distributed, he again proceeds to compose in the manner before described, until the work is finished. The number of times the letter

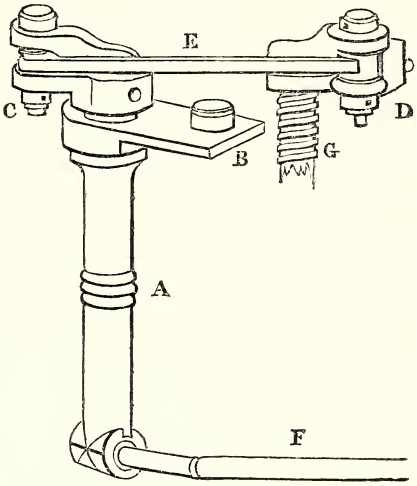
is returned must depend upon the size of the fount. A thousand pounds weight of types would get up five or six sheets, and, therefore, in a fair octavo volume, the letter would be returned five or six times.

The Press is the machine whereby impressions are obtained of the type, when set up by the compositor as above described. On the skill and care of the pressmen depend the beauty of the work. If the press-work be not good, all the labour of the compositor is thrown away; his work makes no respectable appearance, and the master gets no credit.

It has already been mentioned, that very little alteration had been made in the printing press from the time of the first printers to that of Blaew of Amsterdam, about 1620. Blaew's improvements, although of immense advantage, only consisted in alterations in the details, and not in the principle. Blaew's presses have in their turn been superseded by those of Lord Stanhope; and very few are in existence, in England at least, save in old offices, where they are used as proof-presses, or kept merely as curiosities. A description of a bygone piece of mechanism would be of little utility; to show, however, Lord Stanhope's ingenious invention, it is necessary to make the reader understand the original construction. As a great part of the old press is retained in the new, one description will serve for both; premising that the old presses, as well as those first fitted with the Stanhope power, were of wood, but that very soon the latter were constructed of iron, and that, in consequence, the general appearance of the press was much altered. A press then consisted of two upright pieces of immense strength, which rose perpendicularly from the floor to the height of six feet and a half, and were connected with cross

pieces. From about the middle of each of these a slide, called a rib, projected at right angles, and perfectly parallel to each other; a spindle with a powerful screw, kept in its place by these cross pieces, worked in a box called a hose, by means of a bar or lever inserted in it; the toe of the spindle worked in a sort of cup fixed upon a large solid block of mahogany, having the face planed perfectly smooth, and called the platten. It will be evident, that when the bar is pulled down, the spindle will descend in proportion to the worm of its screw, and force down the platten to precisely the same degree, and with great power. A table was made to run in and out upon the above-mentioned ribs; upon this was the form of type; when run in, it was exactly under the platten, and having been previously inked, and the paper laid on it, the bar was pulled over, the spindle, platten, &c. descended, and the consequence was a very powerful pressure of the paper between the platten and the type, causing the latter to give a perfect fac-simile of its surface upon the paper. Lord Stanhope's invention consists in an improved application of the power to the spindle and screw, whereby the power is multiplied many times. This will be best understood by describing an iron press of the modern construction. Upon reference to the engraving, this will be found to consist of a very heavy mass of iron, called the staple *aa*, the outline of which somewhat resembles that of a vase. It is united at the top and bottom, but the neck and body are open. The upper part is called the *nut b*, and answers the purpose of the head in the old press, as it is in fact a box with a female screw, in which the screw of the spindle *c* works; the lower portion of the open part described as the neck is occupied with a piston and cup *d*, *d*, in and on which the toe of the spindle works. On the nearer side

of the staple is a vertical pillar or *arbor e*, the lower end of which is inserted into the staple at the top of the shoulder; the upper end passes through a top-plate *f*, which being screwed on by the upper part of the staple, holds it firmly. The extreme upper end of the arbor being hexagonal, receives a head *g*, which is in fact a lever of some inches length; this head is connected by a *coupling bar h*, to a similar lever or head *i*, into which the upper end of the spindle is inserted.



A, the arbor. B, the top-plate. C, the arbor-head. D, the spindle-head. E, the coupling-bar. F, the bar or lever. G, the spindle and screw.

The bar or lever *k*, by which the power is applied by the workman, is inserted into the arbor, and not into the spindle, by which ingenious contrivance, 1st, the lever is in length the whole width of the press, instead of half, and is, moreover,

in a much better situation for the application of the pressman's strength; 2d, there is the additional lever of the arbor-head; 3d, the additional lever of the spindle-head; and, lastly, the screw itself may be so enlarged in diameter as to have immense increased power. The platten is screwed on to the under surface of the piston; the table *m* has slides underneath, which move *in* the ribs *n*, *n*, instead of *upon* them, and is run in and out by means of girths affixed to each end, and passing round a drum or wheel *o*. As the platten is of considerable weight, the workman would have to waste much strength in raising the platten from the form after the impression has been given, were not a balance-weight *p* suspended upon a lever and hook at the back of the press, which counterbalances the weight of the platten, raises it from the form, and brings the bar-handle back again, ready for another pull. These are the principal parts of the machinery whereby the impression is given, and are sufficient for the general reader, with the aid of the engraving in Plate CCCCXV. For the printer there are yet other appliances. At the right-hand end of the table is an iron frame *q*, moving freely upon pivots, so as to fall upon the table, or rise until stopped by what is called the gallows *r*; this is covered with parchment very tightly stretched, and is then called the tympan; upon the tympan blankets are placed, which are covered by an inner tympan, and fastened by hooks; the whole forming a solid yet elastic and yielding surface, admirably fitted for impressing the paper upon the type (for this is its use), inasmuch as the surface of the parchment is soft and without grain, and readily receives the impression of the type, while the blankets give freely to every projection, without retaining any indentation. To protect those portions of the paper which are not destined

to be coloured from ink or soil, there is at the upper end of the tympan another iron frame, of much lighter make, and also moving upon pivots, so as to fall upon the face of the tympan. This is covered with a sheet of coarse paper, and the exact size and form of the pages are carefully cut out therefrom, the parts left being an excellent protection of the paper under them. This is called a frisket.

Such is the ordinary Stanhope press. Since this was introduced many excellent presses have been invented, and very extensively introduced; but this is so simple, so easily kept in order, and so powerful, that it has never been excelled; and being very intelligible, has been chosen for the illustration. The manner of working is the same in all. A notice of the principle of various other presses will be found in a subsequent part of this treatise.

On the left front of the press stands the inking table. This is a table of mahogany (which is best) or iron, about four feet high and three feet four inches wide; at the back is a slightly elevated stage with a recess at each end, in one of which is the ink, in the other stands the brayer or muller, by which the ink is spread out in a thin layer upon the front of the stage.

It must be fully understood that printers' ink is a very different composition from that used for writing. It is of such consistency, that were a small portion taken up between the finger and thumb, when they were opened it would produce a thread of an inch or an inch and a half in length. Of all the materials used in printing, this is the most important, and the most opposite qualities are required in it. It must be of excellent colour. Formerly excellence of colour was deemed to consist in an exceeding dark hue, not exactly black, but black enriched with a hue of the dark-

est blue or purple. This gave indescribable effect to the works for which it was used, a richness, a gorgeousness, which it is impossible to describe; but the works of Baskerville and Bulmer, especially the Milton of the latter, afford the best specimens. *Now* we hold perfection to consist in the intensest black, and all the resources of chemistry and the arts have been sought to attain this end. It must stand for ever; but here we have miserably failed. Compare the productions of the old printers with those of twenty years back. What a difference! The works of the Aldi and Elzevirs, of Plantinus, Caxton, Pynson, and Grafton, preserve their colour as intense as the day they were printed; there is no yellowness or brownness, no foxiness, whilst the books of those of 1810-20 are wretchedly discoloured. Where fine printing, however, has been required *and paid for*, the modern ink is no whit inferior to the ancient. Witness the beforementioned works of Bulmer, Macklin, Ritchie, Bowyer, Baskerville, and others; but certain it is that the ink in general use twenty years ago was of very inferior quality. It must be perfectly mixed, and ground until it is absolutely impalpable, otherwise it will speedily clog the types and inking apparatus; it must adhere to the paper, and not to the type, or it will tear off the face of the former, and clog up the latter; it must be sufficiently thick; it must keep perfectly undried when in large masses, and dry very quickly when it is distributed in thin surface. No printers of the present day make their own ink, although some add ingredients which they believe to improve the colour or quality. It is an especial business, and, by the aid of machinery, capital, and exclusive attention to the manufacture, the ink now supplied is admirable in the qualities of thorough mixing and grinding, drying, blackness, &c.; but whether it will stand

the test of time, time alone can show. It is an expensive article, the commonest book-ink being one shilling and sixpence per pound, whilst the usual qualities are two shillings and sixpence, three shillings, and four shillings per pound; those used for superior work are five shillings and six shillings, and those for cuts as high as ten shillings, though it is questionable whether, at the latter price, the consumer is not paying for a mere name.

Every manufacturer has, of course, his own secrets, both of ingredient and process. The universal ingredient is the finest possible lamp-black; the great secret probably consists in the manner in which, and the material from which, this is made. There are vast buildings appropriated to the sole purpose of burning oil, naphtha, spirits, coal-gas, &c. to produce this black, which is collected from the sides, ceilings, &c. of the buildings. It is brought from Germany and many other countries; and no expense is spared to get the most superior quality. The next most important article is nut or linseed oil boiled and burnt into a varnish; then oil of turpentine, &c. The following receipts have been given. The first is the method used by Baskerville and Bulmer, and nothing can be better than the results.

1. Fine old linseed oil boiled to a thick varnish, and cooled in small quantities, three gallons; a small quantity of black or amber rosin dissolved therein; the mixture then stands for some months, that all impurities may be deposited; after which it is mixed with the finest lamp-black, and carefully ground for use.

2. One hundred pounds of nut or linseed oil are reduced by boiling and burning one tenth or one eighth of its bulk, and to the thickness of a syrup; two pounds of coarse bread and several onions being thrown in to purify it from

grease. Thirty or thirty-five pounds of turpentine are boiled apart, until, on cooling it on paper, it breaks clean, without pulverising. The former is poured nearly cold into the latter, and well mixed. The compound is then boiled again. Lamp-black is next thoroughly mixed with it, in quantity according to the ink required, and being well ground, the ink is then ready for use. Some add indigo, some Prussian blue, which considerably improves the colour; but these inks are so difficult to work, and so clog up the type, that the *improvement* is better let alone. The turpentine is added to give greater varnish, and improve the drying quality; but if the oil be old and fine, the quantity required is proportionally less.

3. Mr Savage, an admirable artist, denies that any ink can be depended on, of the varnish of which oil is the basis; he therefore gives the following receipt:—Balsam capivi, 9 oz.; best lamp-black, 3 oz.; Prussian blue, $1\frac{1}{2}$ oz.; Indian red, $\frac{3}{4}$ oz.; turpentine soap dried, 3 oz. This ink is of beautiful colour, but appears to work foul. There can be no doubt, however, that the best and cheapest plan is always to purchase what is required of a proper ink-maker.

At the right front of the press stand the *bank* and *horse.* The bank is a deal table of some size; the horse is an inclined plane which stands upon the bank; upon it is laid the white paper prepared for working, which, when worked, is brought from the press to the bank. There are two pressmen to each press, one of whom attends to the inking only, to ascertain the excellence of which he turns, whenever he has a moment to spare, to the worked sheets upon the bank, glancing his eye rapidly over each to see that every part is of its proper colour, and that no picks, or other impressions, mar the work; the other attends only to the press,

and gives the impression. These men are paid by every two hundred and fifty impressions, or by the *token*. Thus, if the number be five hundred, and the price fourpence-halfpenny per token, each man receives ninepence for the five hundred impressions of each form, and the cost therefore is,

First form, two men, two token, at 4½d.....1s. 6d.
Second form, do. do. do. .....1s. 6d.

3s. 0d.

The price necessarily varies with the size of the type and of the form; with the quality of the paper and of the ink; with the number, and the care required. Common work is fourpence-halfpenny, good sixpence, superior sevenpence, the very best eightpence, ninepence, or even twelvepence per token.

The pressmen, having received the forms after the final correction, lay the inner form, or that one which contains the second page, upon the table of the press, and secure it in the centre by quoins; one of them, in the meanwhile, pastes a stout sheet of paper upon the frisket frame, and then secures it upon the tympan. They then ink the form, and take an impression upon the frisket, and cut away all the printed part, which therefore leaves so much of it as is necessary to protect the paper from soil. The puller now carefully folds a sheet of the paper according to the crosses of the chase, and laying it upon the form, opens it carefully, by which the paper is made to lie evenly upon the form, with the same margin with which it is to be afterwards worked. Having wetted the tympan, the pressman closes it down upon the form, and takes an impression, when the paper will be found to adhere to the tympan, and thus become a guide whereby to lay all the subsequent sheets,

and therefore much care should be taken to lay it properly. They now choose their points, which are thin iron arms, having a short point projecting from the end, and made to screw on to the tympan-frame, which must be done in such a manner as that the points may fall in grooves in the cross of the chase; because if they did not, they would be battered and broken upon it at the first pull.

The puller now brings his paper from the wetting-room; for before any good impression can be taken the paper must have been damped, by rapidly passing it, one fourth or one fifth of a quire at a time, through water, and then allowing it to soak for two or three days, until it is evenly and thoroughly damp; and, laying a ream upon the horse, he takes a sheet, and placing it carefully over the tympan-sheet, closes the frisket over it, shuts both tympan and frisket down upon the form, which in the meanwhile his companion has inked (a process that will be described below), runs the table in under the platten, pulls the handle of the bar or lever over by his full weight, until brought up by the stop, at which moment the platten descends and gives a powerful impression to the tympan, &c. upon the form, producing upon the paper a perfect fac-simile in reverse of the surface of the latter. The pressman now gradually releases his hold, the balance-weight raises the platten, the bar returns to its first position, the table is run out, the tympan and frisket are raised by the workman, and the frisket thrown up to the catch. The sheet is taken off the points, which the impression has caused to pierce through it, and carefully examined to ascertain that the impression is just and even, which is the great test of the workman's skill, and the excellence of the press. Invariably the first impression is defective; the parchment may have been thicker in

some parts than in others, the blankets worn, or one of two founts of type may not have been of equal height, in which respect "the estimation of a hair" would be a monstrous fault, the thinnest possible tissue paper being quite sufficient for remedy. The pressman proceeds to overlay, that is, to paste upon his tympan-sheets portions of paper of the exact size of the defects, thicker or thinner as may be required; or if the defect be great, he places a part of a sheet of paper within his tympans. If there be any small portion of undue prominence, or that "comes off hard," he rubs away a portion of the tympan-sheet with wet fingers, or cuts it away altogether. Having, as he supposes, remedied all blemishes, he takes another impression, which he again examines with equal closeness, and carefully removes every remaining defect by the same method; having at length satisfied himself, and his master or overseer, the work is proceeded with, the inker taking even portions of ink well distributed, and covering the form equally, the puller taking a sheet, and laying it on the tympan as before. They thus proceed until the whole number of the white paper is worked off. The form is now lifted from the table, and carefully washed with a very strong lye. The outer form is then laid on and made ready.

This varies a little from the mode previously described. It has been stated that the points penetrate the paper at the first impression. These holes and points are the guides whereby perfect register is obtained; that is, whereby not only the pages, but the lines, are made to fall exactly upon the back of each other, a deficiency in which is a great fault in good book-work. The form, therefore, having been placed in precisely the same place as the previous one occupied, one of the sheets which have been printed

on one side is taken and placed with the face inwards, in such manner that the points pass through the same holes, but of course the opposite way, and an impression is taken. If the pages do not back, the points are shifted until they do; or if the defect be in the form, such alterations are made in it as may be necessary. The impression is then brought up as before, and when all is ready, a thin sheet of white paper, called the *set-off* sheet, is placed over the tympan-sheet and upon the points. It must be remembered that one side has been worked, that the ink has not yet dried, that the paper is still damp; therefore at every impression some portion of the ink will be transferred to, or impressed upon, the set-off sheet. When this has taken place in many impressions, the effect will be doubled; for not only will some of the ink of the print be transferred to the set-off sheet, but some, a very slight portion, of the set-off will be re-transferred to the sheet working, producing a most unpleasing dirty appearance, very mystifying to the eyes, and utterly destructive of beauty. The puller, therefore, after a few impressions, moves the set-off sheet slightly, and when it has become very dirty, discards it, and replaces it with another. The pressman should be very attentive to this; and the master should not grudge ample supplies of set-off paper, for it is not destroyed, but is very useful afterwards in other departments as waste paper. The form is now lifted and carefully washed with lye, and the two are sent to the composing-room, where they are again carefully washed and rinsed, and are then ready for distribution. Two good pressmen are supposed to do about one token, or 250 impressions, per hour, of fair work. This, however, must depend entirely upon the quality of the work required; with small type, stiff ink, and many rules, the work is more slow,

and paid for accordingly. The finest work is seldom paid for by the token, the pressmen being placed upon weekly wages, and allowed as much time as they require, the rapidity being at the discretion of the overseer. Frequently they are limited to a certain number per hour, often as few as fifty, the most careful inspection being given to every sheet by both pressmen, and continual attention by the press-overseer and other chief persons in the establishment. In such work the very best materials are employed. Instead of parchment, the tympans are covered with fine calico, and even silk; instead of blankets the finest broad cloth, picked blotting-paper for the thick overlays, the thinnest tissue-paper for the finer. It will readily be understood, that in all operations of the press-room, where everything depends upon the skill of the workmen, there are infinite minutiæ, which it would be tedious, if it were even possible, to enumerate. Seven years apprenticeship are not more than sufficient to educate a good pressman. It is the accumulated labour of a life to make a first-rate one; and, after all, excellence depends upon the native talent and ingenuity of the man himself.

The ink is distributed over the type either by balls or by rollers. The rollers are of modern use; the balls were, until a recent invention, sheep-skins with the hair taken off with lime, made into a ball with wool, gathered at all corners, and nailed upon a wooden handle. One of these was held in each hand; and a small portion of ink being taken, they were well beaten upon the inking-table, and then upon each other, until the ink was so evenly distributed over the whole surface, that if touched gently with the finger, the prominent lines of the skin would be perfectly blackened, whilst the channels would be left perfectly clean. The

balls were then beaten over every part of the type, so that the whole surface should be evenly covered; an operation requiring much skill and practice. The skins were prepared and softened by the nastiest processes imaginable, which converted a press-room into a stinking cloaca. Thanks, however, to the observation and ingenuity of Mr Donkin and Mr E. Cooper, this has been entirely done away, and a press-room now almost regales the nose with a warm scent of ink and paper, any thing but unpleasant. This invention has been of the greatest consequence to printing. The printing machine is popularly said to be the great engine of modern literature; and so it is; but without this, printing machines were mere old iron and brass. For many years the workmen in the potteries had used a composition of glue and treacle for applying colours to their ware. Mr Donkin observed that this composition possessed every requisite for the use of the printing-office, and he immediately proceeded to form balls of canvass, with a facing of composition. They answered admirably, proved beautifully soft, distributed beautifully, kept clean, and were easily washed and purified if soiled. Some opposition was offered by the workmen; but their advantages proved so great that they were readily adopted by the masters, and speedily drove away for ever the nasty skins. The next step, however, was more important still. Mr Donkin bethought him, that if he could cast rollers of composition, without seam and perfectly cylindrical, it could not fail to be of infinite utility to machine-printing. It remained, however, for Mr Cooper to suggest the substitution of them for balls at the common press. In this he succeeded; but it is astonishing how much difficulty there was in persuading the men to lay aside their old habits. They could not conceive that a straightforward rolling would an-

swer the purpose of their laborious and careful beating. The rollers were nicknamed "rolling-pins," but they made their way, and are now in general use. They consist of a wooden cylinder, with a thick coating of composition cast perfectly true; through the middle of the cylinder passes an iron rod attached to a curved bar passing over the roller, upon which are two handles; and the roller revolves freely upon the rod. The pressman having brayed out a narrow line of ink upon the raised stage of the inking-table (or upon a distributing roller which runs the whole length of the table, and, being turned, presents a line of ink to the inking-roller), takes a portion of this upon the composition, and distributes it carefully upon the table until the entire face is evenly covered, and then rolls the form, taking care that the whole surface receives its due proportion. If he does this lightly and steadily there is no fear of the result; he cannot in rolling overlook any part; but it nevertheless requires some judgment. If there be any heavy titles or large type, he must roll that portion several times; if there be blank pages, he must take care that the roller does not sink, and so leave the pages in line with it slightly touched. The chiefest judgment, however, is displayed in choosing the exact quantity of ink required for the form. If the type be small, the quantity taken must be small; it must be very carefully distributed, and the form rolled many times; for if the quantity be too great the type will become clogged, and if too little, the colour will become faint. The pressman must from time to time examine the sheets as they are printed, turning up the corners of the sheets that he may see whether the colour corresponds to that of the side first worked, and detecting with quick eye every defect; and he must be particularly careful that for every sheet of the same work he take the very same quantity

of ink, that the book when bound may present an even and beautiful colour, every bold line being perfectly covered, and yet every fine stroke clear and distinct. This can only be effected by careful distribution and repeated rolling, with exact judgment as to the quantity of colour to be taken.

The sheet having been thus worked off, the printed paper is taken away by the warehouseman, and hung by the boys upon poles stretched under the ceiling, by means of a peel, which is a handle with a broad end, upon which a quire or two is hung at a time, thence transferred to the poles, and distributed in portions of four or five sheets. Here they hang a day or two, until the ink and paper are perfectly dry. This should be a gradual process, for if by artificial heat the drying is hurried, a skin will be formed upon the surface of the ink, which will prevent that underneath from drying; the work will look very well until it is pressed or bound, when the skin breaks, the ink spreads, and the sharpness of the letter is entirely destroyed. When perfectly dry they are taken down and laid in heaps upon the gathering board, each signature separately; thus, first, a heap, say 1000, of B, then C, D, E, F, and, lastly, the title-sheet A. The boys then take one sheet from each heap; consequently, when they have got to the last signature, each boy has one complete copy of the work. These are laid upon one another in such a manner that each book is perfectly distinct. The warehouseman then takes a collator (a needle inserted in a handle) and goes over the whole with great rapidity, ascertaining that no sheet has been carelessly omitted, and that no two of the same sheet have been taken. The books are then folded down the middle, counted out in tens, thirteens, or twenty-fives, and tied up in fifties. The process of printing is thus complete, and the work is ready for the binder.

Works of finer description, indeed most works of the present day, are submitted to another process after they have been taken down from the poles, viz. hot or cold pressing, which very much improves their appearance. In cold pressing the sheets are placed one by one between glazed boards, or sheets of coarse material pressed until there is a perfect glaze upon both surfaces. The heaps are then placed in an hydraulic press, with cold iron plates at small distances, and the whole is subjected to considerable pressure for some hours; they are then taken out and the sheets extracted from the boards, when the indentations consequent upon the working will have been all pressed out, the roughnesses of the paper smoothed out, a slight gloss given to the ink, and the whole will present a very agreeable smoothness to the eye and the touch. Hot-pressing is used when the paper is very stout and the ink strong. The sole difference is, that the iron plates are heated until they can hardly be touched. The effect is much greater than that of cold pressing; the whole surface of the paper is perfectly glazed, and the ink absolutely shines; but the effect is not so agreeable to the eye; it is too glossy. As these processes also make the books lie perfectly flat, they render great beating by the binder unnecessary, doing away with the danger of such beating causing the ink to set off upon the opposite pages, which danger, should it from circumstances prove necessary to beat the book much, is considerably diminished, as the pressing sets the ink very effectually. The glazed boards must be often cleaned by rubbing with waste paper, or they will dirty the sheets placed between them. Every printing-office of credit should have an hydraulic press and boards; for it is incredible how much smartness pressing gives to the work, and how greatly the warehouse work is

facilitated by the readiness with which the hydraulic is pumped up, and by its great power. A press of eight-inch ram will be found sufficient for most purposes; but where much hot and cold pressing are required, one of nine-inch ram will prove cheapest, because, from its immense power, a few hours are sufficient to give the requisite surface, and the press may therefore be filled twice a day.

Wood-blocks are very often worked with the common type. The block, having been carefully reduced by the engraver to the exact height of the type, is placed in the composing-stick, and justified to the width of the page; it is then made up along with the other matter in its proper place. When laid upon the press for working, and an impression of the form has been taken, the pressman examines with great minuteness whether it stands well with the type; if not, the form is unlocked, and paper placed under it if it be too low, or under any corner that may be lower than the rest; if the block be too high it must be scraped or filed at the bottom. Anciently the artist in wood contented himself with producing his lights and shades by cutting his lines in greater or less degrees of fineness upon a plane, leaving to the printer the task of producing the required effects by a tedious process of overlaying; but since the introduction of machines, in which such method is impracticable, from the nature of the impression, and from the immense loss consequent upon the machine standing still whilst the cut is in preparation, several eminent engravers have turned their attention to the subject, and have succeeded in a method of so cutting away the block that it is put into the printer's hands in a great measure prepared. Notwithstanding this vast improvement, the pressman has much to do; he is to a certain extent an artist, and must have a good

eye for perspective, and for the proper adjustment of tints. These effects he produces by careful and skilful overlaying. The cut may then be worked with the type without any other care than that of keeping it clear from clogging or picks. When done with, it must be very carefully cleaned with spirits of turpentine and a brush.

The working of wood-cuts by themselves as illustrations of works, differs from type-printing in no other respect than the superior materials and skill required. The wood-cut must be imposed in a chase, and locked up upon the table of the press, which is generally a smaller one than that used for ordinary printing, of most excellent construction, and in good order. The tympans are often of silk or cambric.

There are in London, and probably in the larger provincial cities, parties who make an especial business of the manufacture of composition balls and rollers, which they supply to printers upon payment of a rent. The skill and experience of these persons enable them, as must be the case in every instance where a manufacture engages exclusive attention, to supply a much better and cheaper article than could be manufactured by any individual whose engagements are varied; consequently there are not many printers, either in town or country, who do not avail themselves of these opportunities. The rent is paid for each roller required, and by the quarter; that is to say, if a printer employs six presses, and consequently six rollers, he pays for six rollers, the manufacturer engaging to supply him with as many changes as he may require from their getting out of order or being injured; in fact, to keep him supplied with six rollers in good condition. The rent for a common press-roller is the moderate sum of six shillings per quarter; they are sent into the country in boxes fitted for the purpose. There

are, of course, situations in which it is not easy to obtain a regular supply of the necessary article, and in this case the printer may very easily make them for himself; but the expense of the utensils is so great as to exceed the usual rent for years. They consist of the following: For rollers, a hollow cylinder of brass, the bore of which must be most accurately turned and well polished; this mould consists of two semi-cylinders closely fitted and brought into contact by screws along the sides and collars at the end, and a head is made to fit into the lower end. The core, a wooden cylinder, upon which the composition is cast, is held in the centre of the bore by means of a star, through the radii of which the composition flows. For balls are required a concave mirror of about half an inch cavity, and a board of the same size, and of a quarter of an inch in convexity. A kettle for melting and mixing the composition is also required. This is made double like a glue-pot, fitting exceedingly close, and with a small orifice for the escape of the steam from the hot water between the two; and the inner vessel should have a large lip. The recipes for making the composition vary, and this appears to arise from the different circumstances under which it is made. The ingredients are but three, and these easily purchaseable, viz. fine glue, treacle, not that procured from the bakers, which is adulterated, but the best from the sugar-refiners, and a small quantity of carbonate of barytes, called in commerce Paris white. The first two are quite sufficient with a little skill. The following are good recipes.

1. Two pounds of glue to one pound of treacle.

2. Two pounds of glue to three pounds of treacle.

3. One pound of glue to three pounds of treacle and a quarter of a pound of Paris white.

Soak the glue in water until it is soft; then place it in the inner vessel, and boil quickly, until the glue is thoroughly dissolved; add the treacle, mixing it well, and let it boil for an hour or more; then sift in the Paris white, but do not stir it violently, or the mixture will be full of air-bubbles, which are destructive to the roller or ball. Rub the mould slightly with a rag dipped in thin oil, taking care that no globules and streaks remain upon the surface. When the mixture is ready, pour it gently between the radii of the star, so that no air be detained within the cylinder until the mould be filled; allow it to set, and then take it from the mould, cutting off the superfluous portion with a string. When the roller has been hung up twenty-four hours it will be fit for use. In making balls, having oiled the mirror, pour the composition upon the centre, and having allowed it to spread itself, lay over it a piece of coarse canvass, place the board upon it, and lay weights upon it to press it down; it will consequently be found that the composition face of the ball will be slightly thicker in the centre than at the edges, which, besides being a convenience in the working, will allow it to be *knocked up* with much facility, which is done in the ordinary manner. These balls and rollers are very easily kept in order; if they are too soft, cold water will harden them; if too hard, warm water will soften them. When not in use they should be covered with refuse ink, and hung up in a room of even temperature, and carefully scraped with a palette-knife before use. They should not be cleaned with spirits of turpentine, as that will give them a hard surface. These rollers will be fit for use for a long while if attention be paid to them; and when spoiled, the composition may be re-

peatedly melted down, and, with an addition of new materials, will make as good rollers as before. When the proper apparatus is wanting, small balls for wood-cuts or single pages may be made upon an earthen palette, or even upon a smooth dinner-plate.

STEREOTYPING.

STEREOTYPING is a mode of making perfect fac-similes in type-metal, of the face of pages composed of moveable types. Letter-press printing being a very expensive process, the price of books consequently high, and the heaviest expense consisting in the composition, the printers of the Continent very soon set up the entire of such small works as were in constant demand, and thus were enabled to sell them at little more than the cost of paper and press-work. Some works of very great extent, especially Bibles and prayer-books, were kept standing by the privileged printers. This, however, was exceedingly expensive, as the cost of type would be enormous; the forms would occupy vast store-rooms, and be liable to continual damage, both from the accidental dropping of letters, from batters, and other accidents to which they would be unavoidably liable. Some method, therefore, by which all or some of these disadvantages might be remedied, was sought after with great anxiety. About the beginning of the eighteenth century, Van der Mey, in Holland, sought to avoid this liability to accidents, by immersing the bottom of his pages in melted lead or solder, and thus rendering them solid masses: " c'est une réunion des caractères ordinaires par le pied, avec de la ma-

tière fondue, de l'épaisseur d'environ trois mains de papier à écrire;" therefore the mass together would be of somewhat less than the height of our type. It is not very easy to guess how they contrived to make the backs of these blocks of such evenness as to produce anything like a good impression; but Dibdin says that the book is very handsome. The same process was followed by a Jew of Amsterdam, in printing an English Bible; but he was utterly ruined by his speculation.

Some time before the year 1735, there is sufficient evidence that the French used casts of the calendars placed before church-books. These plates are thus described by Camus: "It (one of the plates) is formed of copper, and is three inches and a half long by two inches broad and one seventh of an inch thick. From the roughness of the casting, it has evidently been made in a mould formed of sand or clay." After the plate had been cast, the back of it had been dressed with a file, in order that it might bear equally upon a block of wood to which it had been attached.

Who really invented the art of stereotyping as at present practised (and, after all, he who finds out the efficient *modus operandi* is the inventor of the art, though he may not be of the principle), is, like the inventor of the parent art, a matter of some controversy, which has been carried on with more vigour than the subject merited. It seems however most probable, when all assertions are weighed, that William Ged, a goldsmith of Edinburgh, deserves the credit; thus exhibiting a singular coincidence with Fust. According to his statement, being in 1725 in company with a printer, they lamented the want of a good letter-founder in Scotland; and the printer asked him whether he could do any thing to

remedy the defect. He immediately answered, that it would be more easy to cast plates from pages when composed in moveable type; and he undertook to produce, and very shortly did so, a specimen of his new plan, and not long afterwards made arrangements with a capitalist to advance the requisite funds. The latter failing to perform his part, Ged made a similar contract with a London stationer, in conjunction with whom he made many attempts; but being repeatedly thwarted, he parted from his partner, and made proposals to the universities and the king's printers to stereotype Bibles and prayer-books. These all entered into the scheme with some eagerness, and some works were produced quite equal to the ordinary printing of the day. Nevertheless, so much ignorance and prejudice prevailed amongst the workmen, and others interested, as they imagined, in the old system, that the undertaking was soon abandoned, and Ged entered into several subsequent arrangements, in which he was equally unsuccessful; a type-founder, in particular, causing such obstructions that the art made no progress. Ged died, therefore, before he had met with any encouragement; nor did his son succeed better, although, as the practicability was made more manifest, the very parties who had rejected his plans subsequently made extensive use of his plates. What was Ged's method of stereotyping is unknown, as he kept it private; nor did his partners fully participate in the secret.

Fifty years afterwards, Mr Tilloch made a similar invention; but, from private circumstances, the design was laid aside, not however before several volumes had been printed from his stereotype plates at the press of Foulis. Some years after this Lord Stanhope engaged an ingenious London printer, Mr Wilson, to prosecute the invention; and after

many trials, the noble lord's ingenuity succeeded in bringing the art into perfect use.

When a work is expressly intended for stereotyping, the type used should be somewhat different from that commonly employed. The letter should be cast without any shoulder, but should rise in a straight line from the foot; the spaces, quadrats, and leads should be of the same height as the stem of the letter, because the less the cavities in the page, the less chance there is of any of the mould breaking off and remaining in the form. The page having been composed in the ordinary manner, and very carefully corrected, is imposed in a small chase with metal furniture, and the whole is placed within a moulding frame, somewhat less than half an inch higher than the type. The surface of the type is then rubbed with a soft brush holding a small quantity of very thin oil.

The plaster of which the mould is formed is the common material of which statues and busts are cast; it should be of two degrees of fineness, and may be easily purchased ready prepared. These having been carefully mixed, a small portion of the finer quality is gently poured upon the surface of the page, and softly worked in with a brush, care being taken that every portion is fully covered, and that no air-bubbles remain in any part of the letters. Immediately a larger quantity of the coarser plaster is poured on and spread over the previous layer without disturbing it; a straight-edge is then passed over the moulding-frame, clearing away the superfluous plaster, and leaving that within the frame of uniform thickness. It is then left to set. When sufficiently dry, the moulding frame is raised, and the mould with it; the mould is then dressed, and placed in an oven until it be perfectly dry, and raised to an adequate temperature for the

casting. The oil with which the page is rubbed prevents the plaster from adhering to the type.

The melting-pot is a square vessel of iron about two inches and a half deep, having a separate lid, of which the four corners are cut off, the inner face being carefully turned, the outer face turned hollow towards the centre. A floating plate, of which the upper surface is turned, is placed at the bottom of the pot. Over the melting-pit is a crane with a rack, upon which a pair of nippers are made to run. These lay hold of ears upon the melting-pot, closing with its weight, and opening when relieved. The metal does not differ from type-metal, and must be sufficiently fluxed to flow easily, but not made too hot, or it will prove brittle. The melting-pot having been heated in the same oven with the mould, and consequently to the same temperature, the latter is placed within it, the face being turned down upon the floating-plate. A bar or other piece of iron is screwed down upon that part of the lid which is turned hollow; and the whole being suspended by the rack and crane, is swung over the melting-pit, and gradually let down into the metal, which flows gently into the pot through the openings left at the corners. The metal flowing slowly in gradually expels all the air; the mould immediately rises to the inner surface of the lid; the floating-plate, being specifically lighter than the metal, rises also to the edge of the mould; consequently the metal which has run in between is of the exact thickness of the depth of the mould, the upper surface being the field upon which are the casts of the type, the under surface the smooth face of the floating-plate, and the rest of the melting-pot being filled with metal. The pot is allowed to remain immersed ten minutes or a quarter of an hour, that is, until the air is supposed to be perfectly expelled. The pot is

then drawn up, and swung to a board resting upon a trough of water, and there allowed to cool. The cooling is a process requiring much care and attention. It is obvious, that unless the whole mass cool equally, the plate will be warped, and consequently spoiled; it is equally clear that the heat will more readily radiate at the corners, and consequently that the centre will remain fluid after the other parts are set, and that the contraction must be unequal. This is provided against by the lid having been turned hollow in the centre, and it will therefore allow the metal under it to cool more rapidly. The mass having been turned out from the pot, the metal under the plate is separated by a smart blow or two of the mallet; the floating-plate will be readily disengaged, and the mould be removed from the cast. Some defects will invariably be found in the new plate; but these are removed by the picker, who goes carefully over it, clearing away the picks from the face of the letter, and deepening the larger white lines with a graver, that they may not blacken in working at press; for it must be remembered, that the quadrats and spaces used in stereotyping are higher than those in moveable-type printing. If the face of the plate has cooled evenly, and it is in other respects a successful cast, it is placed, the face inwards, in a turning lathe, and the back rendered a plane parallel to the face; the margins are then squared, and the edges flanched. The plate is now ready for use.

A great improvement in the stereotype art was a few years ago introduced by Mr Thomas Allan, printer in Edinburgh, into his establishment, by which a number of plates are cast at once, whilst the risk of broken casts is considerably lessened. This is effected by means of a pot sufficiently deep to contain moulds placed in a perpendicular

position. The pot is an oblong square cast-iron box, widening towards the mouth, and having placed inside, at each end, a wedge-like block, of which one face is parallel to the side, while the other is perfectly vertical. On the vertical side are perpendicular grooves, at distances rather greater than the thickness of the stereotype moulds. Into these grooves are inserted plates of malleable iron, by which the interior of the box or pot is partitioned into spaces sufficiently wide to admit with ease the plaster moulds. The moulds, when baked, being inserted into these spaces, a cross bar of metal is placed over the top, instead of a cover, which serves to prevent the moulds from being raised by the liquid metal flowing beneath them; and it is then suspended upon the crane, and dipt into the metal-pit in the usual way. By this method not only are the moulds saved from all risk of breaking by being placed horizontally and pressed between the two broad surfaces of a float-block and cover, as in the method of single-page casting, but a number of plates are produced at one cast, and thus additional celerity is combined with greater certainty of sound plates. The plates of the ENCYCLOPÆDIA BRITANNICA, which is the most extensive work ever stereotyped, have been for the most part produced by this process, in pots containing each five moulds; and it is especially advantageous for large plates, the risk of breakage by the old method increasing in a greater ratio than the increase in the size of the page.

The plates are sometimes mounted upon blocks of mahogany, the height of which is the difference between the thickness of the plate and the height of the type. These blocks are furnished with brass sides, the upper part of which is turned over so as to take hold of the flange of the

plate. Many attempts have been made to accommodate these blocks to the varying sizes of the plates, by forming them in portions; but, where much stereotyping is done, the plates are usually cast to uniform sizes, corresponding blocks being kept ready for use. An ingenious plan has been devised to remedy this inconvenience, by a series of hollow squares of type-metal of the requisite height and of different sizes, by means of which pages may be easily composed to any required size, from one pica m upwards; the plates being fastened on by brass holders. At a small expense once incurred, the stereotype printer may furnish himself for ever.

There are many smaller instruments requisite, which it is quite unnecessary to mention. The founder requires some practical skill, which, however, it is not difficult to acquire. The excellence of the casts will depend upon the personal knack and observation of the founder. The metal for stereotyping is generally purchased prepared for use, in preference to melting down old type, the type-founders allowing much more for it in exchange than the metal can be purchased for. The price of prepared metal is about 40s. per cwt. The following, however, are proportions which may be used when the prepared metal cannot be procured:—

1. From five to eight parts lead, one of regulus, one fiftieth of block-tin.
2. One seventh of pure regulus, six sevenths of lead. The best lead is that which comes from China, in the lining of tea-chests.

The mixing of the lead is exceedingly injurious to the workman, and should be avoided wherever it is possible.

The foundry should be thoroughly ventilated, as the fumes from the melting-pit, and the moisture and smell of the drying oven, are very noxious.

An extravagant notion prevails, especially amongst persons not experienced in the mysteries of printing, of the exceeding economy of stereotyping; it would therefore be of advantage to give a fair view of the case. On an average, the cost of stereotyping may be taken as the same as that of composition, or even higher. It is quite clear, therefore, that if the first edition of a work is stereotyped, the speculator at once incurs the expense of *printing* two editions, minus the press-work. The consequence is, that if his untried book does not succeed, he very much increases his loss, or at best he increases his chance of loss, because many books that just get through a first edition never arrive at a second. Therefore the first edition of a work should never be stereotyped, unless indeed the work be of such a nature as to insure a general sale at a low price, as, for instance, Ready Reckoners, Tables of Interest, and such like. Again, what work is there so perfect as not to require some alteration and amendment in a new edition, which, in stereotype, is practicable only to a limited extent. Supposing, next, that the great demand for a work is ascertained, that the matter is sufficiently corrected to require no farther alteration, and that the work has been stereotyped; the owner must wait until the copies printed from the types from which the casting has been made are sold, before he has occasion to make use of his plates. On the one hand, suppose that he print sufficient for four years consumption; and on the other, sufficient for one year at the same rate. The account will stand thus:—

Type.

Cost of composition, 25 sheets, say	L.50	0	0
Press-work, 4000 copies, 200 reams, at 7s	70	0	0
Paper, 200 reams, at 20s	200	0	0
	L.320	0	0
Interest on average of two years (allowing for periodical return of capital)	32	0	0
	L.352	0	0

Stereotype.

Cost of stereotyping	L.50	0	0
1st year, Press-work of 1000 copies, 50 reams, at 9s	22	10	0
Paper, 50 reams	50	0	0
	L.122	10	0
Interest, 1 year 6 months, plates	3	15	0
Ditto, 6 months, print and paper	1	16	0
	L.128	1	0
2d year, Print and paper L.72 10 0			
Interest, plates, 1 year 2 10 0			
Do. print and paper, 6 months 1 16 0			
	76	16	0
3d and 4th year	153	12	0
	L.358	9	0
Balance *against* stereotyping	L.6	9	0

Second Four Years.—Type.

Composition from reprint copy	L.43	15	0
Press-work, 4000 copies, at 7s.	70	0	0
Paper, 200 reams, at 20s.	200	0	0
	L.313	15	0
Interest, average 2 years	31	17	6
	L.345	12	6
Four editions from plates, and interest as before	307	4	0
Balance in *favour* of stereotype	L.38	8	6
Cost of first edition, type	L.352	0	0
Ditto second ditto	345	12	6
	L.697	12	6
Cost of eight editions stereotype	664	13	0
Balance in favour of stereotype at the end of eight years	L.32	19	6

without taking into account repairs and incidental expenses which would be incurred in stereotype *only*, and also not reckoning the produce of overplus copies, which would be proportionately greater in type.

If the type be small, and the composition expensive, it would be considerably in favour of stereotype; but on the *per contra* would be the greater wear and damage of the plates.

Such is a fair statement of the pecuniary profit and loss of type and stereotype; but there are other considerations.

Every edition from the plates must be in the same type, without any of the improvements that skill or fashion may require; whereas every edition from type may be varied to the taste of the day, and any defects in composition or making up remedied. Every edition from the plates must also get progressively worse and worse. It is asserted that no injury can accrue to the plates, but the fact is precisely the reverse; for these plates are particularly liable to injury, from their weight and brittleness, from blows, from picks and batters, which will happen notwithstanding the greatest care, from fractures at the edges in placing on the blocks or raisers, and many other fortuitous circumstances. These it is difficult to remedy, and, when remedied, they present a most unsightly appearance, sometimes from the same fount not being at hand, or sent to the melting-pot (and great changes occur in the types of a printing-office in the course of eight years), sometimes from the new letters not standing of the same height, which is a common fault, and always from their not standing in line. Again, printing from plates never looks so well as that from type; and the most inexperienced eye may instantly detect the difference, even in the first edition.

Nevertheless, in some cases stereotyping is of great advantage; but chiefly in books of numbers, in which it is of the utmost importance that every figure should be correct. In this case the proofs must be read again and again, until the correctness is unquestionable, then stereotyped; and there is no fear of alteration from the error of compositors or carelessness of readers, but the book remains the same for ever. Such works also are most expensive in getting up, and the cost of composition very much exceeds that of stereotyping. Books of logarithms may be especially men-

tioned, tables of longitude, indexes to maps, and other works, which, being once written, remain unchangeably the same: or where it is found expedient to have duplicates of the work, as when immense numbers are required, and it is necessary, for speed, to work on double-sized paper; such, for instance, is the Penny Magazine, from which, when once composed, a cast is taken, and the original and cast are worked side by side at the same moment, producing two copies instead of one, in which case there is another advantage, for the casting does not exceed the cost of composition, and, when worked, the stereotype remains without further expense for another edition: again, where it is expedient to send duplicate plates to a distance to be worked, thereby saving the expense of carriage, and some time; as in the Penny Magazine, where several casts are taken, and one sent to America, another to Germany, &c.; in Chambers' Edinburgh Journal, where one cast is worked at Edinburgh, and another in London; in Richardson's Dictionary, where one cast is used by the London publisher, and another in the United States.

Wood-cuts may be stereotyped with great advantage, for a small cut which has cost several guineas to engrave may be multiplied indefinitely, and that at a cost of a few shillings.

No printer should stereotype who wishes his type to be a credit to his house. The wear of material in casting is miserable; the gypsum is at best a fine powder, and grinds away the edge and face of the letter when rubbed in with the brush, in a frightful manner. The letter can never be entirely freed from the plaster, and will present a very dirty appearance ever after. The wear of a fount of 1000 lbs. weight, returned six times from the foundry, is greater

than would occur in six years' constant fair usage ; besides which, the high spaces, quadrats, and leads, are all extra expenses, for which the economical bookseller makes no remuneration whatever.

School-books are most frequently stereotyped, in ordinary cases with the advantages and drawbacks above related. Suppose, however, a Spelling Book or Primer, say Guy's, selling from forty to fifty thousand copies yearly, in which it might be supposed that stereotype would be of infinite advantage. For such a book, stereotype plates would not last, even in decent condition, four years. Calculate the cost, without interest, the money being constantly returned.

Type.		*Stereotype.*	
Seven sheets, say	L.40	Stereotyping	L.14
Working 560 reams, at 5s...	140	Working 560 reams at 6s...	168
Paper	490	Paper	490
	L.670		L.672
Rent to be paid to printer to keep type standing, say one fourth	L.10		
Print and paper	630		
	L.640	Print and paper	L.658
Cost in four years	L.2590		L.2646

Balance against stereotype, L.56 ;

at the end of which time the types must be set up again, and new plates cast. But any printer will keep standing a work of which such numbers are required, without any charge whatever ; and every worn or battered letter may

be taken out and replaced, so that every edition will be in perfect condition for generations.

The plan of stereotyping Bibles and prayer-books has been nearly abandoned, and the entire sheets are kept standing in moveable type, at incalculable expense, by the Queen's printer, the University of Oxford, and, it is believed, that of Cambridge. Before every edition, however, is worked, every sheet must undergo a careful reading.

OF POLYTYPAGE.

The ingenuity of our lively neighbours the French has been excited for nearly a century in devising a speedy and cheap mode of making solid plates, either in sequence or in substitution of moveable type. Many considerable improvements in stereotyping are to be ascribed to these artists; but stereotyping has never been a favourite with them, and they have rather exerted their invention in a series of experiments, which may be classed under the general name of polytypage.

The first experiment noticeable is that of Dr Franklin and M. Rochon; but although curious, it is not polytypage in the common meaning, or the art of producing letters in relief. But it is very ingenious, and is the first step in that art. Franklin made an exceedingly glutinous ink, with which he wrote upon thin paper, in the ordinary manner, but rather coarsely. This writing he powdered with pounded emery or iron filings, and it was then placed between two plates, of which the lower one was exceedingly hard, and the upper one extremely soft. These were then passed between a rolling press, when the iron-filings or emery sunk into the softer plate, from which impressions might be taken in the manner of copperplate printing. The effect, as may

be supposed, was exceedingly rough and unsightly. M. Rochon then proposed to write with a steel point upon a prepared plate, and bite in the tracing; this would give impressions in reverse, which, whilst the ink was yet fresh, were to be pressed strongly between clean paper, the set-off upon which would be fit for use. By this unskilful means Rochon says many private works were circulated; but it is rather doubtful. M. Rochon next undertook a much more likely project, the stamping of punches, somewhat like types, into soft metal, in the same order and with as much rapidity as they are composed in ordinary printing, with mechanical contrivances to make the impressions stand well, and also to insure the even depression of every letter. These stamped plates were originally intended to be printed by the rolling press; but afterwards the scheme was entertained of taking a cast from the plate in type-metal, and printing from that. It does not appear that this idea was brought into practice.

In 1780, Hoffman, a German, residing in France, brought stereotyping to considerable height; but, not satisfied with his success, he made many ingenious efforts in polytypage. He first used Rochon's method; and whilst he was thus engaged, a practical printer, named Carez, started a new method, which Hoffman afterwards pursued. The page, after being composed in the ordinary manner, was attached, with the face downwards, to the under side of a heavy block of wood, suspended from a long beam. Immediately under the page was an anvil, on which was a tray of oiled paper, into which the workman poured a portion of melted lead, attentively watching the cooling. When the metal seemed on the point of setting, the page, block, and beam, were brought down with a very smart blow, forcing the face of the type into the

cooling metal, and producing a very sharp mould; which again was made to take the place of the type upon the block, was struck in a similar manner upon fused metal, and would thus, as was said, produce a perfect and excellent stereotype plate, which, having been properly dressed at the edges and back, was affixed to the usual wooden raiser; nor does there seem any reason why more than one cast might not be made from the same mould. Carez appears to have practised this art to some extent, and successfully.

Hoffman was no doubt acquainted with this invention, for his next scheme was a modification of it. In order to avoid the expense of composition, he prepared a series of punches, consisting as well of single letters as of common French terminations, which, with a very ingenious instrument, he pressed into a thin layer of prepared clay; and this, when baked, he stamped upon a portion of fused metal, in Carez's manner, producing a stereotype plate. It must be quite evident that in practice this could never answer, because the lining of the letters, and the exact plane of the surface, cannot possibly be achieved with that nicety which is indispensable in printing. Unfortunately, also, the expense and trouble of stamping in the punches separately must be considerably greater than that of composing types, even were it practicable, which it does not seem to be.

In 1791, M. Gegembre printed the fifty sous notes of the Caisse Patriotique upon an improved plan. He caused the whole print of the notes to be engraved in relief upon a plate of steel, the letters and ornaments being run together in a manner impracticable with separate punches; and this engraving he pressed into a plate of alloyed copper, from which stereotyped casts were taken by Carez's process.

Any number of these casts could be taken from the copper mould, as indeed was necessary, since, from the softness of the metal, they were rapidly worn out; and if by chance the copper mould became injured, a new one could be readily made from the steel engraving.

When the revolutionary government commenced issuing assignats, it became necessary to have an immense number of plates to work the enormous quantity of these documents required. A design having been approved of, artists were employed to engrave *three hundred* fac-similes. Of course, if three hundred so-called fac-similes could be engraved, there could be no difficulty to other artists in engraving another hundred, nor could even the bank-officers tell which was a forged fac-simile and which were engraved by their authority. The consequence was utter want of confidence in the government paper. To remedy this, the committee of assignats caused many experiments to be instituted for the production of plates which should be not only imitative and similar, but *pro re* identical. The plan adopted was the engraving a plate *in intaglio*, from which copper punches were obtained *in relief*, and called *mother-punches*. From these *daughters* were struck, which were perfect fac-similes of the original engraving, and were worked by the roller-press in the manner of copperplates. Guillot, the director, reported, that from one engraving, for the 400 livres assignats, he had struck or polytyped 897 *mother-punches* and 1487 *daughters*, of which number only 190 were defective; of the plate for the fifty livres assignats, 4760 mother-punches and 7684 daughters, 1140 of which were defective. The chief defect was, that frequently the air compressed in the mould of a single letter would effectually prevent the fused metal sinking to the full depth, and thus there would be no

letter at all upon the plate. Upon the suppression of assignats this establishment was broken up; but some of the plates and matrices are in the public repositories of France, In printing the tickets of the national lottery, Gatteaux obtained the assistance of Didot the printer, whose firm soon afterwards issued proposals for printing polytyped editions of the classics, at very reduced prices; and in 1798 they issued an edition of Virgil, followed by many other works, remarkable for their neatness and cheapness; so that their plans may be pronounced to have been completely successful. The process differs little from those before described.

Types of the usual form, but of very hard metal, being composed, are placed within a steel box, with the face downwards upon a plate of metal, and pressed slowly and smoothly, but with great force. Since, therefore, all the letters are forced simultaneously and evenly into the plate, no uneven impression takes place. They are then disengaged, and any faults are amended by striking in a punch of the defective letter. From the matrix thus obtained plates in relief are cast, from which the paper is worked, the matrix being put away to strike other plates if needed.

M. Héran, Didot's partner, having separated from the firm, applied himself to the improvement of the art, and hit upon a novel and ingenious mode. This was the formation of a set of types the very reverse of the common, viz. instead of the letter being in relief upon the shank, it was in intaglio; therefore every separate letter would be a die, and instead of the letter being reversed, it would stand as read on the paper. The spaces, quadrats, leads, &c. were of the exact height of the type. These were to be composed like types, so that the entire page would pre-

sent the appearance of a plate of copper into which words, &c. had been punched; the matter was to be read in the metal without a proof, which, as the words read from left to right, was matter of no difficulty. Upon the matrix thus composed fused metal was to be pressed, which would obviously form a complete plate fit to be printed from; and the operation could be repeated until as many plates were struck off as were required. M. Héran first endeavoured to cast his types in a mould like that used by letter-founders; but the metal proved too soft, and he afterwards struck punches into shanks of copper of the required size. Works executed from such plates are of remarkable neatness, and the process may be pronounced of very great utility, although, as far as known, it has never been introduced into England.

Towards the end of the eighteenth century, Professor Wilson of Glasgow, being engaged in a series of experiments for making etchings upon glass with fluoric acid for the purposes of art, thought it possible to make polytypes of glass from engraved copperplates. In this he in some degree succeeded, having executed several polytypes in intaglio from moulds of copperplates, and in relief from woodcuts; but it cannot be said to have been practically successful, the lines not having any degree of sharpness in either case, whilst the brittleness of the material would be a decided objection.

Messrs Heath, Perkins, and other ingenious men, having turned their attention to the prevention of forgery of bank-notes, have produced many excellent plans, amongst which is that of Mr Heath, of taking the impression *en creux* from an engraving of hardened steel upon a cylinder of soft steel afterwards hardened, from which cylinder any number of the plates, fac-similes of the first, may

be readily executed. This plan does not differ in any degree from that of Hoffman and Carez, save in respect of the cylinder; but the manner in which the engraving is executed on the original steel by the lathe is most astonishing. These plans have not been adopted by the Bank of England, but most country banks of issue have greedily adopted this almost complete safeguard against forgery.

Mr Brunel has lately invented an ingenious modification in the making of moulds, which consists in spreading a coating of shell-lac upon a plate of iron, and hardening it in the fire. This is then dipped into the melting-pot, and receives a thin covering of metal, and is then pressed upon the types. The impression produced thereby is most beautiful. The lead can never sink to any depth in the hollows of the page, there are no picks or other soils to clear away, but it may be doubted whether the lead would form a very good mould to cast from.

PRINTING IN COLOURS.

One of the most beautiful aids to typography, the art of printing in colours, has been entirely neglected in this country; at least as far as relates to the embellishing works of ordinary excellence with vignettes, capitals, tail-pieces, and other devices of fancy, in beautiful tints, in the manner of the early typographers. It is true that ingenious artists of the present day have exhibited much skill in illustrating works of natural history, and have shown wonderful genius in publications professedly connected with the fine arts; but, as far as regards the average printing of the day, it is entirely neglected. This may very easily be accounted for. To print in two colours occupies more than twice the time necessary to print in one; and it also requires more skill and ingenuity. These unfortunately must be paid for; and this pecuniary consideration is sufficient to banish from our pages this lovely art. So did not our forefathers; *they* took pride in choosing the most tasteful designs, the most harmonious colours, to illuminate their productions, and beguile the reader into study by the illusive charms of gold, and blue, and crimson. Fortunately, either time was of little value, or the exclusive possession of the market enabled them to demand remunerating prices

for the time thus well bestowed; but in the bustle and competition of our more mercantile days, time is money, and blue and gold, scarlet and green, give way to the equally useful but infinitely less beautiful uniformity of unredeemed black. To a country printer, however, some knowledge of colour-printing would be of infinite advantage, because, as his founts of type are more limited, he can create unlimited variety by a judicious use of colours in job-work: moreover, as he has usually much more time upon his hands, his ingenuity would have ample scope for the production of small works of *vertù*, in a taste which cannot be indulged by the denizen of a busy metropolis.

Except in the execution of works of a very high order, and the imitation of intricate and delicate patterns, printing in colours requires no addition to the ordinary accomplishment of printing, other than considerable ingenuity, and a little practice in preparing the colours. The latter may, it is true, be purchased of the ink-maker prepared for use; but the charge for them is enormous, and they require constant replacement, whilst it is not possible to have on hand every variety of tint. By the purchase of the most simple materials from the oil-shop, the ingenious printer has at his hand every colour that fancy can require, at the most moderate cost, without waste or delay. The appliances are few and cheap: a muller, a marble slab, and a palette-knife; the materials, a can of printers' varnish, to be purchased of the ink-maker, which will keep any length of time, and the raw colours hereafter given, which may be purchased from time to time; care, however, being taken that they are of the best quality, or they will fade and turn rusty in a short time, and be a deformity instead of an ornament to the work.

Useful tints of RED may be prepared of orange lead, vermilion, burnt sienna, Venetian red, Indian red, and lake. Vermilion is the most brilliant of these reds; but its beauty depends very much upon the particular parcel used. The pale vermilion is best for a bright tint, as the dark, when mixed with the varnish, produces a dull red. Orange lead and vermilion ground together produce a very bright tint, which is more permanent than vermilion alone.

YELLOWS are prepared with yellow ochre, gamboge, and chromate of lead. Of these the brightest is the chrome; yellow ochre, when mixed with the varnish, produces a very dull tint.

BLUES are made from indigo, Prussian blue, and Antwerp blue. Of these, indigo is exceedingly dark, and not very easily lightened. Prussian blue is a very useful colour; Antwerp blue is very light.

GREENS may be produced from a mixture of any of the blues and yellows, as gamboge and Prussian blue, chromate of lead and Prussian blue. These may be mixed in any proportions until the required tint is produced; but it must be remembered, that the varnish has a considerable yellow tinge, and will produce a decided effect upon the mixture. With a slight portion of Antwerp blue it will, without the mixture of any of the yellows, produce a decidedly greenish tinge.

PURPLES of any degree of richness are made by judiciously mixing reds and blues.

Sæpia produces a nice brown tint, burnt umber a very hot brown, raw umber a much lighter brown, bistre a brighter still. Neutral tints may be obtained by mixing Prussian blue, lake, and Gamboge. In fact, every pigment that painters use can also be used in printing, avoid-

ing, as much as possible, all heavy colours. In truth, if the printer is desirous of imitating any particular colour, or of producing any particular tint, he cannot do better than consult the nearest artist in oil or water colours (oil in preference), or in default of that, the neighbouring house-painter.

The necessary colours having been procured, the method of preparing them is very simple. Each must first be well ground by the muller upon the slab, even although they may have been purchased well powdered. The colour should then be well mixed with the palette-knife with the varnish, until the pigment has attained the required consistency, which will vary with the quality of the work to be executed; for if it be a posting-bill or coarse job, the ink should be very thin, and consequently a much larger proportion of varnish should be used. If, however, the work be a wood-cut, or in small type, the pigment should be made as thick as possible. If the colour required be a compound, the predominant tint should be first mixed with the varnish, and the lighter tint added in small quantities, until the exact shade required be produced. Thus, if the colour be a dark green, the blue should be mixed up first, and the yellow added; but if it be a very light green, then the yellow should be first applied, and the blue added. If the tint desired be exceedingly light, it will be found that the quantity of raw material to be employed will not make the mixture sufficiently thick to be applied to the type or wood-block: in this case whitening is added to thin colours, and dry white lead to the heavier in considerable quantities, which must be adjusted in the course of mixing. To insure thorough combination, the mixture should be scraped into a corner of the slab, and a very small portion of it spread with the palette-knife, and well ground with

the muller until no specks or lumps appear, then scraped up and placed in another corner. This should especially be done when white lead is used, as it will be found that every little lump when crushed will produce a white streak upon the slab. If this be not carefully done, independently of its tendency to clog the type, it will very materially alter the tint. When the pigment seems sufficiently mixed, it is better to bray it out with the muller instead of the usual brayer, and grind again each particular portion immediately before it is used. Colours may be worked either with a ball or a roller. If the job be large and coarse, and the ink consequently thin, the roller will answer every purpose; but if it be small, and requiring much nicety in the manipulation, decidedly with a ball; but in either case the ink should be well distributed, and the form well beaten or rolled. When two or more colours are employed, they must be worked at as many different times. In this case extreme nicety in the register and justification is required, in order that every colour may fall in its just place, without overlaying any other tint employed in the print. This would be a great dis-sight in any case, but most especially where the composition of colours would produce a third; as, for instance, if any part of a blue line should unfortunately fall upon a yellow, a green outline would be the result. The simplest way to guard against this is to have the wood-blocks all cut to precisely the same size, with the print in the proper place upon each; when, therefore, the first colour has been worked, the form is unlocked, the block taken out, and the second block inserted; it then falls at once into its proper position. If the form consist of type, each line should be carefully composed in its proper body, that is, if three colours be employed for as many different lines in *Pica*,

Small Pica, and *Long Primer*, the one to be first worked should be composed in pica *letters*, the other lines in small pica and long primer *quadrats*. When the second line is to be worked, its quadrats should be taken out and letters inserted, while the type of the first line should be removed and quadrats substituted; and so of the third line. The points on the tympan must never be moved. It is clear, therefore, that if the paper be placed upon the same point-holes as before, and if the form has never been moved, the new line cannot fail to fall into its proper place. The illustrative Plate CCCCXIV. has been worked upon this plan; the black, being the largest body, was first printed, as it afforded the best guide for subsequent working. The blue was next worked, because it was much easier to adjust it to the black, than to adjust the red so exactly that the blue should precisely surround it and yet not infringe upon or retreat from the black, while there would be no difficulty in making the other red portions fall in their proper places. In these cases the paper must never be suffered to dry; indeed the sooner each colour succeeds the other the better. If it be covered with a wet blanket, and the edges well sprinkled, the danger will be little; but if it should dry and shrink in the slightest degree, it will be impossible to obtain register. For printing red-letter days in almanacs and the rubrics in prayer-books (an almost extinct practice), an especial type is used called rubrical; it is cast about an m higher than ordinary type. The black is first worked, quadrats having been inserted in the places of the red letter, which are subsequently withdrawn, and the rubrical type inserted. But as, in so small an insertion in so large a body, this process does not attain any very good register, and is expensive withal, the red-letter

days have been abandoned, and some other distinguishing type (generally old English or black) has been substituted, which sufficiently indicates the day. It would not be possible here to give sufficient instructions to enable a printer to execute landscapes, portraits, and other delicate subjects, in various colours and shades. The chief difference between this and other colour-printing consists mainly in the superior individual skill and ingenuity of the artist, the excellence and truth of his engravings, and the superiority of his appliances. In truth, before the printer can produce any great effect, he must be excellently qualified as a painter, which it is not the province of an article on printing to teach. It will be sufficient to state, that the lighter and more extensive tints, and especially those in which transparent colours are used, are worked first, the colour been gradually deepened by successive blocks, until the required effects are produced; and that the outline is printed last, to give sharpness and finish to the design. The curious reader is referred to Mr Savage's beautiful book on Decorative Printing, and to the many admirable productions of Mr Baxter and Mr Vizetelly. Mr Charles Knight has taken out a patent for a new process in printing in colours, the principle of which consists in a new mode of obtaining register of the different colours. It is understood that *all* the colours are printed before the sheet of paper is taken from the tympan, but not at one impression. The outline is printed at a second operation. The means whereby this is effected may be learned as soon as the specification is enrolled. If the plan succeed (as yet it is but imperfectly tried), it will materially reduce the cost of coloured prints of all descriptions, and especially of maps.

There is no difficulty in printing in gold; it is within the power of any typographer. The type is composed and made ready at press in the usual manner. A quantity of raw or burnt umber is mixed with printer's varnish, to the same consistency as it would be were it intended to be used as ink; but this mixture is then compounded with a considerable quantity of gold size, the same as that used by gilders and japanners. The first mixture is necessary, because it has been found that the umber will not combine with the size. The type is then rolled with this compound, in the same manner that ordinary ink is applied, and the impression is taken upon the paper. Leaf-gold is then laid over it with a piece of wool, and pressed slightly upon it. When the varnish has had time to set, a piece of wool is rubbed roughly over the part printed, and the superfluous leaf is thereby removed, leaving the gold adhering to the varnish. The sharpness of the print will vary with the judgment of the printer in the quantity of sizing applied to the type; for if the press-work be bad, the print will be bad also. For inferior gold-printing bronze powder is extensively used. For this the varnish is made very much thicker than for gold; the method of printing is the same; but after the impression has been given, the powder is brushed over the print, and will adhere thereto, whilst the superfluity may be easily removed. In printing the golden Coronation Sun with this powder, a very distressing disease arose, the hair became perfectly green, and the men were very seriously affected; great caution should therefore be taken that particles of the powder be not allowed to fly about the room. Dutch gold cannot be used as a substitute for gold leaf.

BANK-NOTES.

THE numbers of bank-notes are printed by an exceedingly ingenious process, which, being regulated by machinery, makes it impossible to commit any fraud by printing two notes with the same number. The apparatus consists of a series of brass discs, of which the rim is divided by channels into projecting compartments, each containing a figure. The numbers 1 to 9 having been printed in the course of the revolution of the first disc, and this disc having returned to figure 1, the second disc comes into play and presents a 0, and the two together therefore print 10. The first disc now remains stationary until, in the course of the revolution of the second disc, the numbers 1 to 19 have been printed, when it presents the figure 2, and does not again move until another revolution of the second disc completes the number 20 to 29. Thus the two discs proceed until 99 notes have been numbered, when the third disc comes into operation, and, with the two first, produces 100, consequently the first disc performs one hundred revolutions to ten of the second and one of the third. The notes may be numbered indefinitely by this process, without the possibility of error, the machine, meanwhile, being its own check.

PRINTING PRESSES.

In the description of the Stanhope Press it has been stated that many other presses upon different principles have recently been invented; most of these, however, contain some application of the Stanhope power. The most powerful, but the most expensive, of these is the Columbian or Clymer Press. The power in this is acquired by an extremely powerful lever, the pivot of which is in the top of the near staple: it passes entirely over the press, and is pulled down by a bar inserted in the near side, connected with the Stanhope coupling bar, &c. The platten is attached to the centre of the lever, therefore the impression is perfectly vertical. The principle may be popularly understood by balancing a ruler upon the edge of a piece of wood, holding firmly one end in the left hand, and pressing down the other with the right: indeed a very fair impression of a small wood-cut may be obtained by placing it with the face downwards upon a soft pad, fixing one end of a bar of wood under a staple, and pressing down the other.

Cogger's Press is very powerful. Its principle is a sector or piece of curved steel, so arranged that the lower portion is more curved than the upper; a steel stud traverses upon this. When it moves over the lower and more inclined por-

tion of the sector, it brings down the platten with great rapidity; but in traversing the upper portion, as it presents a less inclined plane, the power is consequently much increased, and is greatest, very great, at the pinch. These presses are complained of by the workmen as being very slow; but the greatest objection to them is, that in making short pulls a ledge is worn upon the sectors, which is a great obstruction to a long fair pull: with proper attention by the pressman this would not occur.

The *Albion* Press, manufactured by Cope's executors, is a general favourite for its exceeding lightness; it runs very easily, the pull is short, the power great, and the means whereby it is attained so simple that there is little fear of the press getting out of order; it is very easily taken down for cleaning, and put up again. The power is gained by causing an inclined piece of steel to become perpendicular; in so doing the platten descends, and the impression takes place at the moment the piece of steel is assuming its upright position.

Cope and Sherwin's *Imperial* is another very excellent press, upon principles which do not greatly differ from the Albion: they are very numerous.

In Harrild's Press the power is obtained by the straightening a knuckle or elbow-joint, in precisely the same manner as the bent arm is straightened. Being of very expensive construction, they have not obtained great sale.

PRINTING MACHINES.

As long as the thirst for literature was confined to books and a few periodicals of limited sale and size, the ordinary printing presses sufficed to supply the demand; nor was it discovered that any further speed was requisite, until the increased facility of conveyance, and the important events at the close of the last century, created a demand for news, that the utmost exertions of the printers were unable to supply; for the attempt to increase the speed by the composition of two distinct forms of type would avail little, so long as the presses could turn out only two hundred and fifty or three hundred sheets each per hour. Accordingly, for this branch of the art were the first machines projected. Many schemes were proposed for accelerating the movements of the press; but the first attempts at anything like the machine afterwards introduced were made by William Nicholson, a gentleman connected with periodical literature, who took out a patent about 1790, for a printing machine, of which the chief points were the following: The type was to be fixed upon a cylinder, being cast narrower towards the bottom, in order, as it were, to radiate from the centre of it. This cylinder, with its type, was to revolve in gear with another cylinder covered with soft leather; an

inking apparatus was applied to the type-cylinder, and the paper was to be impressed by passing between the two; most of these plans were, when modified, adopted by after-constructors. This machine was never brought into practice. König, an ingenious German, was the next who undertook to construct a machine; and, having made considerable advance in his plans, obtained a contract with Mr Walters, the proprietor of the Times newspaper, for manufacturing two for that journal. In these Nicholson's plan was so far altered, that the type was laid upon a flat surface, and the impression was given by their passing under a cylinder of great size. He afterwards invented a machine in which the sheet was printed on both sides before it left the machinery; but, in both, his arrangements for the equal distribution of the ink were so complicated and clumsy, consisting of not less than forty wheels, and the works of every part of the machine so intricate, that it never came into practical use. The first really useful machine was constructed by Messrs Applegarth and Cowper, being an extensive modification of that of König; its principle improvement consisting in the application of two drums between the impression-cylinders, for the purpose of insuring the register of the sheet, by retaining it, after the impression of the first form, just so long that it may pass on to the second cylinder in exact time to be impressed thereby upon the second form; and of the distribution of the ink upon a plane surface, instead of by a complication of rollers, by which König's monstrous machinery was got rid of. These machines are now in general use.

For newspapers, machines are generally made to work but one side at a time. It is manifest that a machine will work a much greater number (more than double) of one

form than of two ; and that the machinery will be lighter and less expensive, and of course require less motive power. One form, therefore, of a newspaper, containing advertisements and the less important matter, is worked at leisure ; and the second form, containing the leading article, important news, and other matter of consequence, is reserved until the last moment, and is then thrown off with immense rapidity. For the usual description of book-work, machines are constructed to work both forms. In these, perfect register and the exact and even distribution of the ink are of the greatest consequence, and such immense rapidity is not necessary. These machines, therefore, differ very much in construction, though not in principle, from those used for newspapers.

In Plate CCCCXV. will be found an engraving of Cowper's admirable perfecting machine, an explanation of which will comprehend a sufficient description of the single machine. Upon slides running the length of the frame which supports the whole machine, traverses a carriage which conveys the two forms of type, and attached to both ends of which are tables for the distribution of the ink. The reciprocating motion is given to this carriage by means of a pinion, which works alternately upon the upper and under surface of a rack. In gear with this carriage, and, supposing the paper to be omitted, in immediate contact with the type, revolve two cylinders of large dimensions, by which the impression is given ; these cylinders are separated by the registering drums, but are kept in uniform and steady motion by two large wheels, the teeth of which work within each other. The ink is distributed over the forms by an apparatus attached to each end of the frame, consisting of a trough which contains the ink, in contact with the edge

of which, or very nearly so, a metal roller called the *ductor* is made to revolve slowly by means of a catgut, which passes over a pulley attached to the axis of the impression-cylinder. A composition-roller is made to rise into contact with the ductor and receive a portion of ink, with which it descends, and thus communicates it to the inking-table as that passes underneath it at the extremity of the traverse. Two composition-rollers are placed somewhat diagonally across the frame, and their spindles being of extra length, as the table passes under them they are caused to revolve and also to travel slightly across it, thus evenly distributing the ink all over the surface of the inking-table, the cross motion removing any accidental accumulation of ink. The table now traverses under four other composition-rollers, supplying them with an even quantity of colour, which they in turn distribute over the type as it passes under them in going and returning, the form being thus rolled no less than eight times. These rollers are merely dropped into notches in the frame, their own weight sufficing to retain them in their places, and give the necessary impact upon the type. For the purpose of carrying the paper round the different cylinders there are two distinct series of endless tapes, one of which, coming in contact with the left surface of a small roller,[1] passes from thence to the right surface of the first cylinder, and underneath it; thence *over* the first and *under* the second drum; thence to the

[1] The description commences with that portion of the machine where the paper first enters the machinery, for *endless* tapes can of course have no *beginning;* the words *first*, *second*, and *third*, &c. must therefore be understood to refer to the position as respects the *right hand* of the reader.

left surface of and under the second cylinder; from this it passes to the right, until it arrives at the roller first mentioned. The course of the second series of tapes is different; for, following the course of the first series, and in contact with it (supposing the paper withdrawn) until it has passed with it under the second cylinder, it then takes a different direction, and, turning to the left, passes over the machine until it arrives at the roller from which we have commenced the description. Both series of tapes are kept tightly stretched by means of various small rollers revolving in different parts of their course. The paper being laid upon other tapes from a table at the right of the machine, is moved forward until it comes in contact with the endless tapes, and being received between them, it is passed under the first cylinder, and the first side is then printed; thence passing over and under the drums on to the second cylinder, it receives the impression upon the other side; thence it passes onward to the point where the tapes take different directions, when it is shot out printed on both sides, upon a board between the cylinders and under the drums. The whole machine is put in motion by means of a strap which passes over a wheel under the frame, and *may* be worked by the power of men, but is mostly worked by steam. It is capable of doing very fair work at the rate of from 2000 to 2400 impressions, or 1000 or 1200 perfect sheets, per hour; it requires but two boys, one to lay on and one to take off the sheets.

The machine with which the Times is printed is also constructed by Messrs Applegarth and Cowper. It consists of four impression-cylinders, two of which are in contact with the types at the same moment; the other two rising in the meanwhile. There are consequently eight series of

tapes, two for each cylinder. It requires four boys to lay on and four to take off, and the machine will give 4200 impressions within the hour. Its appearance, of course, differs very much from the machine before described.

The ingenuity of these gentlemen, especially of Mr Cowper, has been exerted in the invention of many mechanical improvements in printing. Several of his machines, upon various constructions, have been brought into use with considerable success. These, however, are the principal machines of his invention. They at first, it is believed, turned their attention to the fixing stereotype plates upon the periphery of the impression-cylinder, and brought the scheme into practice; but these are superseded by the simpler and more useful machines above described.

The machines of Mr Napier are in very general repute. They have the advantage of being easily worked by two men, thus saving the great expense and unavoidable dirt where a steam-engine is employed, with its necessary appliances, boilers, coals, &c. They stand in a very small compass, and do beautiful work. As far as regards motion and impression, they do not greatly vary from those previously described; but in the method of conveying the paper, obtaining register, and inking, they are altogether different. The paper is laid to a certain gauge, when in the revolution of the cylinder grippers are made to compress the edge of the paper upon it, very much in the manner in which the fore-finger closes on the thumb. It is by these means conveyed entirely round it, in the course of which the first impression is given. At the commencement of the second revolution these grippers open at the precise moment the grippers attached to the second cylinder close, and thus convey the sheet over the second form. Tapes

pass under the second cylinder, *between* the blanket and the paper, and over a pulley upon a bar, by the mere friction of which the sheet is thrown out upon a board. These grippers are made to act with such perfect certainty that the best possible register is obtained. The inking apparatus consists of a trough with a ductor and vibrating roller, which communicates the ink to composition-rollers, by the revolution of which in contact with each other the ink is perfectly distributed, and from these to the type. A cross motion is communicated to the distributing roller by means of a worm in the elongated spindle. As but one impression is given during the traverse of the table in each direction, the cylinder which does not at the moment hold the paper would be in contact with the type, had not Mr Napier added a beautiful adjustment, whereby the cylinders rise and fall alternately, so that the one not in use passes over the form intact. This machine will work from 1000 to 1200 perfect sheets per hour, and requires but two boys. Mr Napier has constructed several other machines of great merit, one of which, for newspapers, will perfect 2000 sheets per hour by the labour of two men. Another with four cylinders, for rapid newspaper work, prints the Morning Chronicle newspaper at the rate of 6000 sheets on one side per hour. But the perfection of speed will be obtained by one for which he has lately taken out a patent, by which the extraordinary speed of 15,000 or 20,000 per hour will be obtained. The ordinary type is affixed to the periphery of a cylinder of enormous dimensions, in contact with which ten smaller impression-cylinders revolve, each with its inking and other apparatus so arranged that every revolution of the large cylinder works ten sheets of any size; and yet so steady and so silent is its motion, that there

is no danger of any disruption of the type, even at that extraordinary rate. The types are held in their place by means of the rules, which are made considerably larger at the top than at the bottom, thus occupying the space which would be found in consequence of the types not being so formed as to radiate from the centre of the cylinder. Mr Napier is the inventor of many very ingenious improvements in the machinery of printing.

Mr Rowland Hill has brought into partial use a machine giving 10,000 impressions per hour; the types are slightly pyramidical, in order to radiate from the centre of the cylinder upon which they are fixed. These machines, however, are better adapted to printing stereotype plates, to which a curved form could be given, which is the principle of Nicholson's and other early machines.

A machine-press has long been at work in Mr Spottiswoode's office, in which the impression is given by a self-acting platten, tables, rollers, friskets, and tympans. It does beautiful work, at the rate of 600 or 700 impressions per hour.

A well-seeming press has also lately been imported from America, in which there is an admirable application of two friskets, which are made to run in and out and rise and fall alternately. The tympan is upon the platten. There appear, however, to be some practical defects in the working. Owing either to this or their high price, or prejudice, they have not been successfully introduced.

These are by no means all the machines that have been devised, constructed, or brought into use. They are, however, all that it is necessary to mention, as the same principle is common to all. Every maker is at liberty to build them, with such modifications as his own talents may suggest.

The many-coloured excise stamps and cheques are printed by very complicated and ingenious machinery, the invention of the late Sir William Congreve. They are printed from steel or copper plates, the plate from which the dominant colour (as black) is transferred being cut away in those parts where the red appears, whilst the red plate has the parts which are to receive the ink in relief; the edges of the two plates being bevelled, the relievo of the red plate fits with exquisite nicety into the corresponding parts of the black plate; these being properly adjusted on the machinery, the red plate descends, and is then coloured by rollers, as is the black plate, which remains stationary; the red plate now rising, fits itself into the black plate, and the impression is instantly given, thus printing both colours at once, and with such excellent adjustment, that it is almost impossible, by the minutest examination of the print, to form any guess of the mode of execution. The apparatus for adjusting these plates has of course nothing in common with ordinary printing machines, and it differs materially from them in other respects: the table is stationary, the cylinder traverses over it, and the inking appliances follow it in its traverse.

READER'S MARKS OF CORRECTION.

THE opposite plate of the marks used by printers in marking corrections (from the plate given in Hansard's Typographia), and the following explanation, will be found very useful to authors.

1. A wrong letter. A line is drawn through the wrong letter, and the proper one written in the margin. After every mark of correction a line / should be drawn, to prevent its being confounded with any other in the same line.

2. A wrong word. This is struck out, and the proper one written in the margin.

3. An omission. A caret ʌ is marked in the place of insertion, and a similar mark is prefixed to the omitted word. When a letter is omitted from a word, the caret should have a head, thus ʎ.

4. A *space (techn.)* wanted. This mark is also used when the spacing is insufficient.

5. A *space* to be removed or diminished.

6 A word or letter to be deleted.

7. A turned letter.

8. A space or quadrat *sticking up*. It is sometimes marked thus ⁑ both in the text and margin.

An Exemplification of Typographical Marks.

" THE art of Printing is but three hundred and ninety years old; end it long remained an undetermined point between the ~~town~~ of Mentz in Germany, and ^ city of Haerlem^in Holland, concerning the place where, and the per‿son by whom, this divine art was first invented and praactised; ~~but~~, but, at this time, the majority of voices have determined the dispute in favour of Mentz; however, we shall give both their pleas.

" It is said to have been first |at Mentz| attempted| between the years 1440 and 1450, by John Fust or Faust, John Meydenbuch, and John Genesteisch, surnamed Guttemberg. [It was a long controverted question by many learned antiquarians ^ whether Guttemberg or Faust was the inventor of that art, till happily the original instrument was found.

Whereby it appears, that ^ on account of the great expenses attending the cutting of the blocks of wood; which, atfer they were once printed from, became ~~entirely~~ useless for any other work. This instrument, which is dated Nov. 6, 1455, is decisive in favour of Guttemberg; but the honour of single types made of metal is ascribed to Faust ^ wherein he received great assistance from his servant and son-in ^ law Peter Schoeffer, who, ^ &c.

[1] *a* [2] *city* [3] *the* [4] ♯ [5] ‿ [6] δ δ [7] 9 [8] | [9] *tr.* [10] *N. P.* [9] *tr.* [11] *No break.* [12] ^ *See below.* [9] *ft* [14] *stet.* [13] *Ital. S. Caps. Caps.* [15] ,/ ;/ :/ [16] |-| [19] *wf* [17] ‿"

^ *the latter only connected the others with him for the sake of their purses, he not being able to proceed without,*

9. A word or letter to be transposed. Where letters only are to be transposed, it is better to strike them out, and write them in their proper sequence in the margin, like a correction.

10. A new paragraph. This should be avoided as much as possible, as it causes great trouble and expense.

11. No new paragraph. This is equally troublesome and expensive.

12. Insertion of a sentence.

13. Alteration of type. One line is drawn under the word for *italics*, two for SMALL CAPITALS, three for CAPITALS.

14. A word struck out, and afterwards approved of.

15. Correction or insertion of stops *(points)*. These should always be encircled, as otherwise they might escape notice.

16. Mark for a hyphen or rule.

17. The manner in which the apostrophe, inverted commas, the star and other references, and superior letters and figures, are marked.

18. When letters or lines do not stand even.

19. A letter of a wrong fount.

The reader should be careful to make no mark in the text without making a corresponding one in the margin, otherwise it will not be attended to. The author should also understand that he should always look out for "printers' errors," the printer not being fairly responsible after a proof has passed under the author's eye, unless he has been palpably deficient in care in his reading department.

SCALES OF PRICES OF COMPOSITION.

THE following scales of the prices paid to compositors in London, Edinburgh, and Dublin, will be found useful to printers, and not deficient in interest to the general reader.

LONDON SCALE OF PRICES FOR COMPOSITORS' WORK,

Agreed upon at a General Meeting of Master Printers, at Stationers' Hall, April 16, 1810.

ART. 1. All works in the English language, common matter, *with space lines*, including English and Brevier, to be cast up at 5¾d. per 1000; if in Minion, 6d.; in Nonpareil, 6¾d.—*Without space lines*, including English and Brevier, 6d. per 1000; in Minion, 6¼d.; in Nonpareil, 7d.; in Pearl, *with or without space lines*, 8d. Heads and directions, or signature lines, included. A thick space to be considered an n in the width, and an n to be reckoned an m in the length, of the page; and where the number of letters amounts to 500, 1000 to be charged; if under 500, not to be reckoned: and if the calculation at per 1000 shall not amount to odd threepence, the odd pence to be suppressed in the price of the work; but where it amounts to or exceeds threepence, there shall be sixpence charged. M and

n quadrats, or whatever is used at the beginning or end of lines, to be reckoned as an m in the width.

2. Works printed in Great Primer to be cast up as English; and all works in larger type than Great Primer, as half English and half Great Primer.

3. All works in foreign languages, though common type, *with space lines*, including English and Brevier, to be cast up at 6¼d. per 1000; if in Minion, 6¾d.; Nonpareil, 7½d.—*Without space lines*, including English and Brevier, 6½d.; Minion, 7d.; Nonpareil, 7¾d.; and Pearl, *with or without space lines*, 8¾d.

4. English Dictionaries of every size, *with space lines*, including English and Brevier, to be paid 6¼d. per 1000; *without space lines*, 6½d. (In this article are not included Gazetteers, Dictionaries of Arts and Sciences, and works of a similar description, except those attended with extra trouble beyond usual descriptive matter.) Dictionaries of two or more languages, of every size, *with space lines*, including English and Brevier, to be paid 6½d. per 1000; *without space lines*, 6¾d. If smaller type than Brevier, to take the proportionate advance specified in Article 1.

5. English Grammars, Spelling Books, and works of those descriptions, in Brevier or larger type, *with space lines*, to be paid 6d. per 1000; *without space lines*, 6¼d. If in two languages, or foreign language, *with space lines*, 6¼d. per 1000; *without space lines*, 6½d.

6. Small-sized folios, quartos, octavos, and works done

in Great Primer or larger type (English language), which do not come to 7s. when cast up at the usual rate, to be paid as follows:—English and larger type, not less than 7s.; Pica, 8s. 6d.; English 12mo to be paid not less than 10s. 6d., and Pica not less than 11s. 6d. per sheet.

7. Reviews, Magazines, and works of a similar description, consisting of various sized letter, if cast up to the different bodies, to be paid 2s. 6d. per sheet extra.

8. Pamphlets of five sheets and under, and parts of works done in different houses, amounting to not more than five sheets, to be paid one shilling per sheet extra; but as it frequently occurs that works exceeding a pamphlet are often nearly made up without a return of letter, all such works shall be considered as pamphlets, and paid for as such.

9. Works done in sixteens, eighteens, twenty-fours, or thirty-twos, on Small Pica and upwards, to be paid 1s. 6d. per sheet extra. If on Long Primer, or smaller type, 1s. per sheet extra. Forty-eights to be paid 2s. per sheet extra, and sixty-fours 2s. 6d. per sheet extra.

10. Works requiring an alteration or alterations of margin, to be paid for each alteration, 1s. per sheet to the pressmen, if altered by them, and 6d. to the compositor as a compensation for making up the furniture; if altered by the compositor, then he is to be paid 1s. for the alteration, and the pressmen 6d. for the delay. This article to be determined on solely at the option of the employer.

11. Bottom-notes consisting of twenty lines (or two notes,

though not amounting to twenty lines) and not exceeding four pages in every ten sheets in quarto or octavo; one page (or two notes, though not amounting to one page) and not exceeding six pages in twelves; two pages (or two notes, though not amounting to two pages) and not exceeding eight in eighteens or above, to be paid 1s. per sheet; but under the above proportion no charge to be made. Bottom-notes consisting of ten lines (or two notes, though not amounting to ten lines) in a pamphlet of five sheets or under, and not exceeding two pages, to be paid 1s. per sheet extra. Quotations, mottos, contents to chapters, &c. in smaller type than the body, to be considered as notes. [Where the notes shall be in Nonpareil or Pearl, in twelves, the number of pages to be restricted to four; in eighteens, to five pages.] *This article is intended only to fix what constitutes the charge of* 1s. *per sheet for bottom-notes; all works requiring a higher charge than* 1s. *for bottom-notes are to be paid for according to their value.*

12. Side-notes to folios and quartos not exceeding a broad quotation, if only chapter or date, and not exceeding three explanatory lines on an average in each page, to be paid 1s. per sheet; in octavo, if only chapter or date, and not exceeding three explanatory lines on an average in each page, 1s. 6d. per sheet. Cut-in notes, in smaller type than the body, to be paid for in a similar manner. Side and bottom notes to many, particularly historical and law works, if attended with more than ordinary trouble, to be settled between the employer and journeyman.

13. Greek, Hebrew, Saxon, &c. or any of the dead characters, if one word and not exceeding three lines in any

one sheet, to be paid for that sheet 1s. extra; all above to be paid according to their value.

14. Greek, *with space lines*, and without accents, to be paid 8½d. per 1000; if with separate accents, 10d.; *without space lines*, and without accents, 8¾d.; with accents, 10¼d.; the asper not to be considered an accent. (If Dictionary matter, to take one halfpenny advance.)

15. Hebrew, Arabic, Syriac, &c. to be paid double. Hebrew with points to be cast up as half body and half points doubled.

16. Music to be paid double the body of the sonnet type.

17. Index matter, though but one measure, to be paid 2s. per sheet extra.

18. Booksellers' Catalogues (in whatever language) to be cast up at 7d. per 1000, not including the numbering.

19. Night-work to commence and be paid for, from ten o'clock till twelve, 1s.; all after to be paid 3d. per hour extra, till six. Morning work, commencing at four o'clock, to be paid 1s. extra. Sunday work, if not exceeding six hours, to be paid for 1s.; if for a longer time, 2d. an hour.

20. Jobs of one sheet or under (except Auctioneers' Catalogues and particulars) to be cast up at 7d. per 1000; if done in smaller type than Brevier, to take the proportionate advance specified in Article 1. If in foreign language, of one sheet or under (except Auctioneers' Ca-

talogues), to be cast up at 8d. per 1000; if done in smaller type than Brevier, to take the proportionate advance specified in Article 1.

21. Where two pages only are imposed, either opposite to or at the back of each other, they shall be paid for as two pages; but if with an endorse, or any other kind of matter constituting a third, then to be paid as a sheet if in folio, a half sheet if in quarto, and so on.

22. Broadsides, such as leases, deeds, and charter-parties, above the dimensions of crown, whether table or common matter, to be paid the double of common matter; on crown and under, to be paid one and one half common matter. The endorse to be one fourth of the inside page, as common matter.

23. All corrections to be paid 6d. per hour.

24. The imprint to be considered as two lines in the square of the page.

25. Different volumes of the same work to be paid for distinctly according to their value.

At a Meeting of the Masters, held Jan. 16, 1816, *the following Modification took place in the Compositors' Scale of Prices of* 1810, *as far as regards Reprints.*

All reprinted works to be paid three farthings per thousand less than the Scale of 1810. All manuscript or original works shall continue to be paid for as at present.

ABSTRACT OF THE SCALE.

		COMMON.	FOREIGN.	DICTIONARIES.		GRAMMARS, &c.		GREEK.	
				English.	2 Languages or Foreign.	English.	2 Languages or Foreign.	Without Accents.	With Accents.
MANUSCRIPT.	ENGLISH TO BREVIER — *leaded*	d. $5\frac{3}{4}$	d. $6\frac{1}{4}$	d. $6\frac{1}{2}$	d. $6\frac{1}{2}$	d. 6	d. $6\frac{1}{2}$	d. $8\frac{1}{2}$	d. 10
	ENGLISH TO BREVIER — *solid*	6	$6\frac{1}{2}$	$6\frac{1}{2}$	$6\frac{3}{4}$	$6\frac{1}{4}$	$6\frac{1}{2}$	$8\frac{3}{4}$	$10\frac{1}{2}$
	MINION — *leaded*	6	$6\frac{3}{4}$	*$6\frac{1}{4}$	*$6\frac{3}{4}$				
	MINION — *solid*	$6\frac{1}{4}$	7	*$6\frac{3}{4}$	*7				
	NONPAREIL — *leaded*	$6\frac{3}{4}$	$7\frac{1}{4}$	*$7\frac{1}{4}$	*$7\frac{1}{2}$				
	NONPAREIL — *solid*	7	$7\frac{3}{4}$	*$7\frac{1}{2}$	*$7\frac{3}{4}$				
	PEARL — *leaded or solid*	8	$8\frac{3}{4}$	$8\frac{3}{4}$	9				
REPRINT.	ENGLISH TO BREVIER — *leaded*	5	$5\frac{1}{4}$	$5\frac{1}{4}$	$5\frac{3}{4}$	$5\frac{1}{2}$	$5\frac{1}{2}$	$7\frac{3}{4}$	$9\frac{1}{4}$
	ENGLISH TO BREVIER — *solid*	$5\frac{1}{4}$	$5\frac{3}{4}$	$5\frac{3}{4}$	6	$5\frac{1}{2}$	$5\frac{3}{4}$	8	$9\frac{1}{2}$
	MINION — *leaded*	$5\frac{1}{4}$	6	*$5\frac{3}{4}$	*6				
	MINION — *solid*	$5\frac{1}{2}$	$6\frac{1}{4}$	*6	*$6\frac{1}{4}$				
	NONPAREIL — *leaded*	6	$6\frac{3}{4}$	*$6\frac{1}{2}$	*$6\frac{3}{4}$				
	NONPAREIL — *solid*	$6\frac{1}{4}$	7	*$6\frac{3}{4}$	*7				
	PEARL — *leaded or solid*	$7\frac{1}{4}$	8	8	$8\frac{1}{4}$				

Notes constituting the Charge of One Shilling per Sheet.—See Article 11.

4to and 8vo.....20 lines or 2 notes and not exceeding 4 pages in 10 sheets.

12mo.....1 page or 2 notes and not exceeding 6 pages in 10 sheets.

18mo or above.....2 pages or 2 notes and not exceeding 8 pages in 10 sheets.

Pamphlets.....10 lines or 2 notes and not exceeding 2 pages in 5 sheets.

* In the former editions of this Abstract, there is an error of a farthing in the charge for Minion and Nonpareil Dictionaries.

EDINBURGH.—1805.

1. That all works considered as common be cast up at 4½d. per 1000, including heads and directions.

2. That Session-work and Jobs be paid at the rate of 5½d. per 1000.

3. That all Dictionaries done in the manner of a Lexicon be paid at 5d. per 1000; but not to extend to Dictionaries of Science, or such as, from their nature, can be considered only as common matter.

4. That Pamphlets of five sheets and under be paid one shilling per sheet above what they come to by letters, for furniture and extra trouble.

5. That all works heretofore paid double (Greek and Scheme), take a proportionate advance according to the first proposition.

6. That all works printed in a foreign language, though common type, be paid at 5d. per 1000.

7. That all works done on Nonpareil be paid at 5d. per 1000; and on Pearl, at 5½d. per 1000.

8. That Grammars and School-books, where Roman and Italic words occur alternately, with braces, different justifications, &c. be paid at 5½d. per 1000.

9. That newspapers be considered as liable to a proportionate advance, according to the first proposition.

Corrections are paid in Edinburgh at 6d. per hour.

DUBLIN.

1. All works in the English language, common matter (including Brevier and English), to be cast up at 5d. per 1000; if in Minion, 5½d.; Nonpareil, 6¼d.; and Pearl, 7¼d.; head and direction or signature lines included. A thick space to be considered an n in the width, an n to be reckoned an m in the length of the page; and where the number of letters amount to 500, 1000 to be charged; if under 500, not to be reckoned; and if the calculation at per 1000 shall not amount to an odd 6d., the odd pence to be suppressed in the price of the work; but where it amounts to or exceeds 6d., there shall be 1s. charged: m and n quadrats, or whatever is used at the beginning and end of the lines, to be reckoned an m in the width.

2. All works done in Great Primer, or larger type, to be cast up as English.

3. Works that do not come to the under-named prices per sheet, when cast up according to Article 1 (such as small-sized folios, quartos, octavos, or under, &c.), to be paid as follows: English, and larger type, 7s.; Pica, 8s. 6d. [octavos and under, in Pica, 9s.]; Small Pica, 11s.; Long Primer, 14s.; Bourgeois, 17s.; and Brevier 20s., per sheet.

4. Manuscript copy, or a work having been printed before, but now so varied or corrected as to equal manuscript in trouble, to be paid ½d. per 1000 in addition to the rules which govern book-work, except manuscript copy for jobs.

5. All works in foreign language, though common type (including Brevier and English), to be cast up at 5½d. per 1000; if in Minion, 6d.; Nonpareil, 6¾d.; and Pearl, 7¾d.

6. Greek without accents (the asper not to be considered one) to be cast up at 8d. per 1000; with accents, 9d. [When Greek, or any of the dead characters, is intermixed (as in Grammars, &c.), to be paid as if the entire were Greek or such other dead character, &c.]

7. Hebrew, Arabic, Saxon, Syriac, &c. to be paid double the prices specified in Article 1. [Hebrew with points to be cast up as half points and half Hebrew doubled. Irish to be paid 7½d. per 1000.]

8. When any quantity of Greek, Hebrew, Saxon, Syriac, &c. or any of the dead characters, is interspersed, and does not exceed one line in any one sheet, to be paid, for each character, 6d. for said sheet; from one to three lines, 1s.; from three to six lines, 2s.; and from six to twelve lines, 3s.; all above to be paid according to their value. [Not less than an average line of the work to constitute a line.]

9. Algebra, Greek, or Hebrew, &c. ruled work, to be paid one half in addition to the price of the work.

10. Arithmetics, and similar works, to be paid 2d. per 1000 in addition to the specified prices in Article 1.

11. Algebraic works to be cast up at 10d. per 1000; where Algebra is interspersed, and amounts on an average to two pages (but does not exceed three and a half pages) in a sheet of quarto; three pages (but does not exceed seven pages), in octavo; five pages (but does not exceed eleven pages), in twelves, to be cast up at 8d. per 1000. Where Algebra does not amount to the afore-named smaller quantities, or only interspersed with signs, &c. to be cast up at 6d. per 1000.

12. English Dictionaries of every size (including Brevier and English), to be cast up at $5\frac{1}{2}$d. per 1000. [In this Article are not included Gazetteers, Geographical Dictionaries, Dictionaries of Arts and Sciences, and works of a similar description.] Dictionaries of two or more languages, common type (including Brevier and English), to be paid 6d.; if in smaller type than Brevier, to take the proportionate advance specified in Article 1.

13. English Grammars, Spelling Books, and works of these descriptions (in Brevier, or larger type), to be paid $5\frac{1}{4}$d. per 1000; if in two languages, or foreign language, $5\frac{1}{2}$d. per 1000.

14. Works, or parts of works, done in columns, to be paid 1s. per sheet for each column after the first. [Article 13 not to take advantage of this Rule, unless the columns exceed three, in which case an additional 1s. only can be charged.]

15. Booksellers' Trade Catalogues (in whatever language) to be cast up at 7d. per 1000; Sale Catalogues, 5½d.; and Auctioneers' Catalogues, as common matter.

16. Bottom-notes, not exceeding twenty lines, in a work amounting to more than five sheets, to be paid 1s. for each sheet in which they occur. Bottom-notes in a pamphlet of five sheets or under, not exceeding ten lines, to be paid 1s. per sheet. When they are heavier, or attended with extraordinary trouble, the price to be settled between the employer and journeyman. [When the notes shall be in Nonpareil or Pearl, the number of lines to be restricted to one half. Quotations, mottos, contents to chapters, &c. in smaller type than the body, to be considered as notes.]

17. Side-notes to folios or quartos, not exceeding a broad quotation, if only chapter or date (and not exceeding three explanatory lines on an average in each page), to be paid 1s. per sheet; in octavos, if only chapter or date (and not exceeding three explanatory lines on an average in each page), 1s. 6d. per sheet; in twelves, if only chapter or date (and not exceeding three explanatory lines on an average in each page), 2s. per sheet. Where side-notes are heavy, and attended with extraordinary trouble (as in law and historical works), the price to be settled between the employer and journeyman.

18. In-cut notes, in smaller type than the body, to be paid 1s. per sheet for each sheet in which they occur; when they are heavy, an additional charge to be made.

19. Making up furniture for pamphlets, and works or

parts of works done in one or different houses, amounting to five sheets or under, to be paid at the following extra rates per sheet, for each sheet of furniture made up: Octavos, and upwards, 1s. 6d.; twelves, 2s.; eighteens, 2s. 6d.; twenty-fours, 3s.; and thirty-twos, 3s. 6d.

20. Different volumes of the same work to be paid for distinctly, according to their value.

21. Works done on different sized paper (as medium and royal, &c.), and requiring an alteration in margin, to be paid 1s. per sheet for each alteration.

22. Music to be paid double the body of the sonnet type.

23. Where two pages only are imposed, either opposite to or at the back of each other, or otherwise, to be paid for as two pages; but if with an endorse, or any other kind of matter constituting a third, then to be paid for as a sheet, if in folio; a half sheet, if in quarto; and so on.

24. Ruled work to be paid double; ruled work with blank columns, tabular, or schedule matter (as Jackson's Book-keeping), to be paid one and one half. [Two or three head-rules and four columns to be considered tabular; all above to be reckoned table-work. The first to be paid one and one half; the second double.]

25. Headings to be paid one third what the face of the job will come to by letters, leaving a fair margin at the bottom, the same as worked at the head; when the heading is under size, one third of the prices in Article 3 to be paid.

Endorses on folio headings, below demy, to be paid one half the price of the heading; above demy, one fourth; headings, with one column down the side, to be paid the amount they would come to by letters. Endorses on such, below demy, to be paid one fourth the heading; above, one eighth.

26. All extra work at the stone to be paid 6d. per hour; where the time spent at the stone does not amount to an hour, less than 6d. shall not be paid for each time of laying up.

27. Jobs of every description, not otherwise provided for, to be entitled to an increase of 2d. in each 1s. according to the rules which govern book-work. Any work making a sheet not to be considered a job, but paid for as book-work.

28. Different labels, with or without rule or flower borders, imposed together, to be paid double, according to the size page they make, but not less than 6d. each shall be paid when they do not exceed the size of a twelves page.

29. Posting broadsides (as charity-sermon bills, ship advertisements, &c.) to be paid as follows: Post, 4s.; medium, 5s.; royal, 6s.; super-royal, or double crown, 7s.; those having a large portion of type not less than Great Primer (as proclamations, play-bills, &c.), to be paid one half in addition to the aforesaid prices. Broadsides in smaller type than Great Primer (as leases, &c.), to be paid one and one half what they come to by letters. Broadsides ruled and figured (as rent-rolls, accounts, &c.), under medium, to be doubled; medium size, or upwards, to be trebled.

Endorses on broadsides to be paid one sixth of the broadside as plain matter. [Should the endorse be ruled, to be paid one third.]

30. When works of an intricate nature occur, and cannot be governed by the existing rules, the price of the work to be settled between the employer and journeyman.

AMENDMENT
OF THE SEDITIOUS SOCIETIES ACT.

In 1839, in consequence of the numerous vexatious prosecutions under the Seditious Societies Act, the London printers procured an act to be passed for the modification or repeal of the obnoxious clauses. As this statute is not generally known in the trade, and very little by the public, it has been thought advisable to include it in the present publication.

2 Vict. cap. 12.

An Act to amend an Act of the Thirty-ninth Year of King George the Third, for the more effectual Suppression of Societies established for Seditious and Treasonable Purposes, and for preventing Treasonable and Seditious Practices, and to put an end to certain Proceedings now pending under the said Act. [4th June 1839.]

Whereas, in an act passed in the thirty-ninth year of the reign of King George the Third, intituled "An Act for the more effectual suppression of societies established for seditious and treasonable purposes, and for the better preventing treasonable and seditious practices," certain provisions are contained, to restrain the printing or publishing

of any papers or books whatsoever, which should be meant or intended to be published or dispersed, without the name and place of abode of the printer thereof being printed thereon in the manner in the said act specified:* And whereas the said provisions have given occasion to many vexatious proceedings at the instance of common informers, and it is expedient to discourage the same: Be it therefore enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present parliament assembled, and by the authority of the same, That so much of the said act as enacts that every person who, after the expiration of forty days after the passing of the said act, shall print any paper or book whatsoever, which shall be meant or intended to be published or dispersed, whether the same shall be sold or given away, shall print upon the front of every such paper, if the same shall be printed on one side only, and upon the first and last leaves of every paper or book which shall consist of more than one leaf, in legible characters, his or her name, and the name of the city, town, parish, or place, and also the name (if any) of the square, street, lane, court, or place in which his or her dwelling-house or usual place of abode shall be; and that every person who shall omit so to print his name and place

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* By the 39th Geo. III. c. 79, s. 27, a penalty of L.20 was imposed on *every* copy of a work printed without an imprint on the first and last leaves. By sect. 1 of the 51st Geo. III. c. 65 (an act to explain and amend the 39th Geo. III. c. 79), the number of penalties was limited to twenty-five; and by sect. 2, justices were empowered to mitigate *each* penalty to a sum *not less* than L.5. These two sections are virtually repealed by the 2d sect. of the present act.

of abode on every such paper or book printed by him, and also every person who shall publish or disperse, or assist in publishing or dispersing, either gratis or for money, any printed paper or book which shall have been printed after the expiration of forty days from the passing of the said act, and on which the name and place of abode of the person printing the same shall not be printed as aforesaid, shall for every copy of such paper so published or dispersed by him forfeit and pay the sum of twenty pounds,—shall be and the same is hereby repealed.*

II. And be it enacted, That every person who, after the passing of this act, shall print any paper or book whatsoever, which shall be meant to be published or dispersed, and who shall not print upon the front of every such paper, if the same shall be printed on one side only, or upon the first or last leaf of every paper or book which shall consist of more than one leaf, in legible characters, his or her name and usual place of abode or business, and every person who shall publish or disperse, or assist in publishing or dispersing, any printed paper or book on which the name and place of abode of the person printing the same shall not be printed as aforesaid, shall for every copy of such paper so printed by him or her forfeit a sum *not more* than five pounds: Provided always, That nothing herein contained shall be construed to impose any penalty upon any person for print-

* In addition to the penalties imposed by the 39th Geo. III. c. 79, s. 27, for the omission of the imprint, it has been held, that a printer cannot recover for work and labour or materials used in printing any work, unless he affixes his name to it. *Bensley* v. *Bignold*, 5 B. & A. 335. This case is equally applicable to the 2d sect. of the present act.

ing any paper excepted out of the operation of the said act, either in the said act, or by any act* made for the amendment thereof.

III. And be it enacted, That in the case of books or papers printed at the University Press of Oxford, or the Pitt Press of Cambridge, the printer, instead of printing his name thereon, shall print the following words: "Printed at the University Press, Oxford," or "The Pitt Press, Cambridge," as the case may be.

IV. Provided always, and be it enacted, That it shall not be lawful for any person or persons whatsoever to com-

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* The act here referred to is the 51st Geo. III. c. 65, by the 3d section of which it is enacted, "That nothing in the said recited act (39th Geo. III. c. 79) or in this act contained shall extend or be construed to extend to require the name and residence of the printer to be printed upon any bank-note, bank post bill, bill of exchange, or promissory note, or upon any bond or other security for payment of money, or upon any bill of lading, policy of insurance, letter of attorney, deed or agreement, or upon any transfer or assignment of any public stocks, funds, or other securities, or upon any transfer or assignment of the stocks of any public corporation or company authorized or sanctioned by act of parliament, or upon any dividend warrant of or for any such public or other stocks, funds, or securities, or upon any receipt for money or goods, or upon any proceeding in any court of law or equity, or in any inferior court, warrant, order, or other papers printed by the authority of any public board or public officer in the execution of the duties of their respective offices, notwithstanding the whole or any part of the said several securities, instruments, proceedings, matters, and things aforesaid, shall have been or shall be printed, any thing herein or in the said recited act contained to the contrary thereof in anywise notwithstanding."

mence, prosecute, enter, or file, or cause or procure to be commenced, prosecuted, entered, or filed, any action, bill, plaint, or information, in any of her Majesty's courts, or before any justice or justices of the peace, against any person or persons, for the recovery of any fine, penalty, or forfeiture made or incurred, or which may hereafter be incurred, under the provisions of this act, unless the same be commenced, prosecuted, entered, or filed in the name of her Majesty's Attorney-General or Solicitor-General in that part of Great Britain called England, or her Majesty's Advocate for Scotland (as the case may be, respectively); and if any action, bill, plaint, or information shall be commenced, prosecuted, entered, or filed, in the name or names of any other person or persons than is or are in that behalf before mentioned, the same, and every proceeding thereupon had, are hereby declared, and the same shall be, null and void to all intents and purposes.

V. And be it enacted, That immediately after the passing of this act, it shall be lawful for any person against whom any original writ, suit, action, bill, plaint, or information shall have been sued out, commenced, or prosecuted, on or before the day of the passing of this act, for the recovery of any pecuniary penalty or penalties incurred under the said recited act, to apply to the court in which such original writ, suit, action, bill, plaint, or information shall have been sued out, commenced, or prosecuted, if such court shall be sitting, or if such court shall not be sitting, to any judge of either of the superior courts at Westminster, or to any justice of the peace before whom any such plaint or information shall be pending, or any conviction shall have been had or obtained, or to any other justice of the

peace acting for the same county, riding, division, city, borough, or place, as the justice of the peace before whom such plaint or information shall be pending, or such conviction shall have been had or obtained, for an order that such writ, suit, action, bill, plaint, or information shall be discontinued, or such conviction be quashed, upon payment of the costs thereof out of pocket incurred to the time of such application being made, such costs to be taxed according to the practice of such court, or in case of any proceeding before a justice, to be taxed and ascertained by such justice; and every such court or judge, or justice of the peace, as the case may be, is hereby authorized and required, upon such application, and proof that sufficient notice has been given to the plaintiff or informer, or to his attorney, of the application to make such order as aforesaid; and upon the making such order, and payment or tender of such costs as aforesaid, such writ, suit, action, bill, plaint, or information shall be forthwith discontinued, or such conviction shall be quashed, as the case may be: Provided always, That in all cases in which any such writ, suit, action, bill, plaint, or information shall have been sued out or commenced subsequently to the sixteenth day of April one thousand eight hundred and thirty-nine, it shall be lawful for such court, judge, or justice, as aforesaid, to make such order for discontinuing the same, or quashing any conviction had thereon, without payment of any costs; and in every such case, on the making of such order, such writ, suit, action, bill, plaint, or information shall be forthwith discontinued, or such conviction shall be forthwith quashed, as the case may be: Provided always, That nothing herein contained shall be deemed or taken to enable any person to recover back any money paid before the passing of this act, in pursuance

of any judgment or conviction duly obtained under the provisions of the said recited act.

VI. And be it enacted, That the said act, and all acts made for the amendment thereof,* except so far as herein

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* The clauses of the 39th Geo. III. c. 79, relating to printers, unrepealed by this act, are,—

Sect. 23. "That every person having any printing press, or types for printing, shall cause a notice thereof, signed in the presence of and attested by one witness, to be delivered to the clerk of the peace acting for the county, stewartry, riding, division, city, borough, town, or place, where the same shall be intended to be used, or his deputy, according to the form prescribed in the schedule hereunto annexed; and such clerk of the peace, or deputy, respectively, shall, and he is hereby authorized and required, to grant a certificate in the form prescribed in the schedule hereunto annexed, for which such clerk of the peace or deputy shall receive the fee of one shilling, and no more; and such clerk of the peace, or his deputy, shall file such notice, and transmit an attested copy thereof to one of his Majesty's principal Secretaries of State; and every person who, not having delivered such notice, and obtained such certificate, as aforesaid, shall, from and after the expiration of forty days next after the passing of this act, keep or use any printing press, or types for printing, or, having delivered such notice and obtained such certificate as aforesaid, shall use any printing press or types for printing in any other place than the place expressed in such notice, shall forfeit and lose the sum of twenty pounds."

Sect. 29. "That every person who, from and after the expiration of forty days after the passing of this act, shall print any paper for hire, reward, gain, or profit, shall carefully preserve and keep one copy (at least) of every paper so printed by him or her, on which he or she shall write, or cause to be written or printed, in fair and legible characters, the name and place of abode of the person or persons by whom he or she shall be employed to print the same; and every person printing any paper for hire, reward, gain, or profit, who shall omit or neglect to write, or cause to be written or printed, as aforesaid, the name and place of his or her employer on one of such printed papers, or to keep or preserve the same for the space of six calendar months next after the printing thereof, or to produce and show the same to any

repealed or altered, shall be construed as one act together with this act.

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justice of the peace who, within the said space of six calendar months, shall require to see the same, shall, for every such omission, neglect, or refusal, forfeit and lose the sum of twenty pounds."

Sect. 34. " That no person shall be prosecuted or sued for any penalty imposed by this act, unless such prosecution shall be commenced, or such action shall be brought, within three calendar months next after such penalty shall have been incurred."

" SCHEDULE.—No. IV.

" *FORM of Notice to the Clerk of the Peace, that any Person keeps any Printing Press or Types for Printing.*

" To the Clerk of the Peace for ——— [*here insert the county, stewartry, riding, division, city, borough, town, or place*], or his deputy.

" I, *A. B.*, of———, do hereby declare, that I have a printing press and types for printing, which I propose to use for printing, within ———, [*as the case may require*], and which I require to be entered for that purpose, in pursuance of an act passed in the thirty-ninth year of the reign of his Majesty King George the Third [*set forth the title of the act*].

" Witness my hand, this ——— day of ———.

" Signed in the presence of ——— "

The clauses of the 51st Geo. III. c. 65, which remain unrepealed, are the 3d and 4th sections, of which the former is set out in p. 184, ante, and by the latter it is enacted, " That if any person or persons shall think himself, herself, or themselves aggrieved by any conviction, judgment, or determination of any justice or justices, relating to any matter or thing in the before-mentioned act contained, then and in that case, he, she, or they may appeal to the justices of the peace at the general quarter sessions to be holden in and for the county, city, or place, where such conviction, judgment, or determination shall have been made, next after the expiration of twenty days from the making thereof, first giving six days' notice of such appeal to the person or persons prosecuting for such penalty or penalties; and the said justices shall hear and determine the said appeal at such general quar-

VII. And be it enacted, That this act may be amended or repealed by any act to be passed in this present session of parliament.

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ter sessions, or, if they think proper, adjourn the hearing thereof until the next general quarter sessions to be holden for such county, town, or place; and the said justices may in like manner, if they see cause, mitigate any penalty or penalties, and may order any money to be returned which shall have been paid or levied under any conviction as aforesaid, and may also order and award such costs to be paid by either party to the other as they shall think and judge reasonable."

COPPERPLATE PRINTING.

It has already been mentioned that the principle of printing from engravings on copper or steel is the very reverse of printing from types, inasmuch as the former are graven in intaglio and the latter in relief, and consequently the pigments are contained within the lines of the one, and the surface of the plate is free of all colouring matter, whilst the surface of the other is carefully covered with ink, and the depressions are as carefully kept clean. It must be sufficiently obvious that these essential differences must require very different manipulations. Accordingly, the printing of such engravings has little in common with letter-press printing. The copperplate or roller press may be described as consisting of two upright cheeks, with ribs diverging at right angles. At a short distance above these ribs is a solid iron cylinder, which is made to revolve by means of a star, consisting of many radii, as long as the height from the ground will permit. Upon the ribs runs a carriage; under the carriage, but not attached to it, is a roller, which, by means of a lever, is made to rise, thus pressing the carriage with any degree of force against the upper cylinder. The copperplate is laid over a brazier of ignited charcoal, and

when at a sufficient heat, the workman takes a considerable quantity of ink upon a rubber of linen rag, and smears the whole face of the plate, working it carefully into every mark of the graver; the heat of the fire, at once expelling the air and thinning the ink, causes it to enter into the minutest strokes, so that the slightest scratch or corrosion in the copper presents itself upon the paper: a plate even not sufficiently polished, that presents no visible defects to the clearest eye, will cause the paper to appear dirty; so exact are the effects of this mode of printing. When the ink has been sufficiently rubbed in, the face of the plate is cleared of the superfluous ink with another linen rubber; the workman then, with the balls of his hands, carefully cleanses the surface, drying his hands upon a lump of whitening, until the face is perfectly cleaned and polished. In this operation the skill of the workman is exhibited, for in thus cleansing the plate he must be most careful not to rub out the ink from the gravures, and to leave colour proportioned to the depths of shadows required; for although the engraver may, indeed must, have defined every stroke, much depends upon the manner in which the printer does his part. It is not every man that has a rolling press that can produce first-rate prints. On the contrary, he must be himself no inconsiderable artist, and stands in a much higher relation to the engraver than the bellows-blower to the organist. The plate being ready for printing, is removed from the brazier to the carriage of the press; the paper, well damped, is laid upon it; a leather tympan is closed over it, the carriage run in a little, and the lever raised; the carriage, &c. being thus brought into close contact with the upper roller, the latter is made to revolve by turning the star; this causes the carriage and

plate to run in, and thus an immense lineal impression is given to every part. The ink used in copperplate printing differs somewhat from that used by letter-press printers. It is of two kinds; one for fine ornamental work, one for common printing. For fine work, such as large and delicate engravings, the material used is the finest Frankfort black; it is ground on a stone with a muller, and mixed with weak burnt linseed oil, until it attains a consistency of thick paste; a little strong burnt oil is then added, and it is then ground up again, a drier to make the ink set firm on the paper being added. The drier is composed of small portions of litharge, white copperas, and sugar of lead; these should be well pounded with the muller before they are ground up with the oil and black. A small portion of the best Prussian blue may be added; but the greatest care must be taken that it be well triturated, as otherwise it is liable to make the best work smear. The blue must be ground up by itself with weak oil; to this driers are to be added. The whole compound is then to be ground up again, and added to the black: the mixture must be then ground upon the stone for about ten minutes, the palette-knife being freely used until all portions are thoroughly commingled. The ink for common work is prepared in the same manner, but without the Prussian blue; and the common English black is substituted for that of Frankfort.

Copperplate presses, of a superior description, made chiefly of iron and brass, have lately been introduced, in which several excellent appliances are to be found to diminish the labour and improve the general quality of the work. The most important improvement would appear to consist in heating and inking the plates, without removing

them from the press, and distributing the ink over the surface and in great measure removing it by means of composition-rollers, the ultimate cleansing being left to manual skill as before. In copperplate printing, however, so much depends upon the skill and care of the workman, that whatever improvement may be made in the mode of gaining pressure and other mechanical means, it does not appear probable that the present slow and careful process will ever be superseded.

LITHOGRAPHY.

LITHOGRAPHY is the art of taking impressions from drawings or writings made on *stone*.

The principles upon which this art is founded are, first, the quality which a compact granular limestone has of imbibing grease or moisture; and, secondly, the decided antipathy of grease and water for each other.

A drawing being made upon the stone with an ink or crayon of a greasy composition, is washed over with water, which sinks into all the parts of the stone not defended by the drawing. A cylindrical roller, charged with printing ink, is then passed all over the stone, and the drawing receives the ink, whilst the water defends the other parts of the stone from it, on account of its greasy nature.

This process, therefore, depends entirely upon chemical principles, and is thus distinct from letter-press or copper-plate printing, which are altogether mechanical. On this account it has in Germany been called *chemical printing;* and as metallic plates can be prepared to be printed from in a similar manner, lithography is considered only as a branch of chemical printing.

I. HISTORY OF LITHOGRAPHY.

The invention of lithography was the result of accident. Its inventor, Alois Senefelder, the son of a performer at the theatre-royal of Munich, was placed for education at the university of Ingolstadt, as a student of jurisprudence; but after his father's death he attempted a theatrical career. Not succeeding in this, he became an author, though his poverty prevented him from publishing his works. He now tried many plans with copper-plates and compositions, as substitutes for letter-press, in order to be his own printer. He found, in the course of his experiments, that a composition of soap, wax, and lamp-black, formed a good material for writing on his plates; that, when dry, it became firm and solid, and that it resisted aquafortis. Wanting facility in writing backwards on the plates, he got some pieces of Kilheim stone, as cheap materials, upon which he could practise after polishing their surfaces. One day being desired by his mother to take an account of some linen about to be sent to be washed, and having no paper at hand, he wrote the account on a polished stone, with his composition ink, intending to copy it at his leisure. When he was afterwards about to efface this writing, it occurred to him that he might obtain impressions from it; and having eaten away the stone with acid for about the hundredth of an inch, he found that he could charge the lines with printing ink, and take successive impressions. This new mode of printing appeared to him very important, and he persevered through all difficulties in applying his discovery to practical purposes, and in improving it.

In the course of many experiments, he found that it was not necessary to have the letters raised above the surface of the stone, but that the chemical principles by which grease and water are kept from uniting, were alone sufficient for his purpose. This point obtained, lithography may be said to have been fully discovered. All that was required was the improvement of the materials, and the mode of working with them, and the construction of a proper press for taking the impressions.

The perseverance with which he followed up his experiments, in order to overcome the difficulties which successively arose in his progress, is astonishing, and the more so, considering the total want of method in his proceedings. Often did he waste months in surmounting a difficulty which a little knowledge, or a very little reasoning, would have enabled him to conquer immediately. His uniform plan seems to have been, to try the first thing that came to hand, and so on in succession, till chance rewarded his assiduity by presenting to him the material suited to his purpose.

The first essays he made to print for publication were some pieces of music, executed in 1796 ; but afterwards he attempted drawings and writings. The difficulty he had in writing backwards led him to the process of *transfer ;* and the use of dry soap, which was found to leave permanent traces that would give impressions, naturally led to the mode of chalk-drawings.

Having made considerable improvements, Mr Senefelder obtained, in 1799, a patent privilege for Bavaria, when he made known his process, and afterwards entered into partnership with Mr André of Offenbach, who proposed to establish presses, and take out patents at London, Paris,

and Vienna. For this purpose Senefelder came to London with a brother of André's, and the invention having been much spoken of, under the name of *Polyautography*, most of the principal English artists made trials of it. Unfortunately, however, the art of printing from the stones was not then fully understood, and the difference between the materials of Germany and those of England, used both for the purposes of drawing and printing, caused constant failures, and the artists in succession abandoned the practice of it. To this cause is to be attributed the slow progress which lithography made for many years in England, as it was left entirely in the hands of *amateurs*, whose productions, generally speaking, did no credit to the art, and whose faults were in some degree supposed to be those of the art itself.

In August 1800, Senefelder, who had now separated from André, went to Vienna, where, after much difficulty, a patent was obtained, and extensive preparations were made for applying his process to print cottons; but bad management, and some unfortunate circumstances, prevented his success, and he returned to Munich in 1806, leaving the establishment in other hands.

In 1806, Mr Mitterer, professor of drawing at the public school at Munich, practised lithography to multiply copies for the pupils, and is said to have invented the chalk composition in its present form, or at least to have improved it greatly.

From this period, the practice of the art has extended and improved rapidly, and more particularly at Munich, where several establishments were formed for the purpose of applying it to the fine arts, as well as for printing writings and official forms for the different departments of the government.

In October 1809, Senefelder was appointed inspector of the royal lithographic establishment at Munich, for printing from stone a complete map and survey of Bavaria; after which period he devoted his time to experiments, and to writing the history of his invention. Among other points of improvement to which his attention was directed, was a substitute for the stones, which are inconvenient to use on account of their weight; and they are also liable to break in the press when used without due caution, or when they contain flaws. For this purpose he made a composition of drying oil, finely ground earth, and other substances, which was thinly spread over pieces of parchment; but nothing of this sort has hitherto been found to answer. The surface cracks after repeated wetting and exposure to the power of the press, and the printing ink then enters the cracks, and spoils the impressions. Thus a very small number only of good impressions can be obtained. A public exhibition of printing from this stone paper was made in London, on the 23d July 1821, by a partner of Mr Senefelder; but the result was not such as to induce much confidence in the ultimate success of the trials to form this desirable substitute of a light material for a heavy one.

In England lithography was never entirely given up from its first introduction in 1800, although it was but little practised after 1806, till its revival at the latter end of 1817. Since then it has been most sedulously cultivated, and with such success, that its importance as a branch of trade is now almost equal to the art of engraving.

In France but little was done in lithography till 1815, when it was established at Paris by Lasteyrie, and being taken up by good artists, it soon attained great excellence. Since this period it has extended most rapidly, and there

is not now a town of any importance, either in Europe, North America, or in the East or West Indies, where lithography is not practised.

II. DESCRIPTION OF THE MATERIALS, AND THE MODE OF PREPARING THEM.

1. *Of the Stones, and the manner in which they are prepared to receive the Drawings.*

As calcareous stones will all imbibe grease and moisture, and effervesce with an acid (the use of which will appear when we speak of the process of printing), they are all capable of being used for lithography. Those are best adapted to the purpose which are very compact, of a fine and equal grain, and free from veins, or imbedded fossils or crystals.

The quarries of Solenhofen, near Pappenheim, in Bavaria, furnished the first plates, and none have as yet been found to equal them in quality. They are of a very uniform pale yellowish-white colour. The fracture is perfectly conchoidal. The beds divide into thin portions of considerable size, with perfectly flat surfaces, and were on this account carried to Munich and other places, for paving kitchens and halls, and thus came in the way of Senefelder when he discovered the chemical process of printing.

The stones of this quarry vary in their quality, but the best may be had in great abundance. Generally speaking, the hardest are the best, provided they are quite uniform in texture. Such are necessary for fine chalk-drawings; softer ones may do for ink, or for coarser drawings in chalk.

In France, stones have been found near Chateauroux

(*Departement de l'Indre*), of a similar colour to those of Solenhofen, and even harder and of a finer grain; but they are so full of large spots of a softer nature, that it is scarcely possible to get one perfect of a greater size than twelve inches square.

In England, a stone has been used for lithography which is found at Corston, near Bath. It is one of the white lias beds, but not so fine in grain, or so close in texture, as the German stone, and therefore far inferior. But it is good for transfers, and does tolerably well for ink drawings or writings. Another stone, found near Stony Stratford, is also used; but it is of a brownish-gray tint, and too dark in colour to show the effect of the drawing with sufficient clearness.

To bear the pressure used in taking the impressions, a stone twelve inches square should be at least an inch and a quarter thick. The thickness must increase with the size of the stone, but two inches and a half are a thickness sufficient for stones of three feet by three feet and a half.

The stones, when sawn to a proper size and thickness, are ground level by rubbing two of them face to face with water and sand, and very carefully examined with a straight-edge, to ascertain that they are perfectly level in all directions. This applies only to the side which is afterwards to receive the drawing, as the natural division of the stone is sufficiently true for the back.

To prepare them for chalk-drawings, two stones, which have been perfectly levelled, are well washed, in order to free them from any of the coarser grains of sand which have been previously used upon them. They are now to be placed on a board over a trough, and a small quantity of water and fine sand being strewed over the surfaces, they

are to be rubbed face to face, adding occasionally a little fresh sand and water. The best sort of sand in England is that called silver sand for preparing the stone, and the common brown sand for giving a fine grain. The sands must be passed through a sieve of the fineness required, which will vary with the nature of the drawing; and the greatest care must be taken to have the sieves perfect, and to prevent any coarser particles of sand from being mixed with the rest. A single grain would fill the stone with innumerable scratches, which would all appear in the drawing. The upper stone is in this operation moved in small circles carefully and equally all over the under one, taking care not to move the one beyond the edge of the other, or the faces would become rounded. When the grain is equal, and sufficiently fine, the stones are carefully washed, and wiped with a clean cloth. The stone, thus prepared, should have, when dry, a perfectly uniform appearance in the colour and grain, and resemble a sheet of vellum. It should be free from scratches, and have no shining parts. The upper stone is always the finer grained of the two.

To prepare the stones for ink-drawings or writings, the process just described is first followed. They are then well washed to get rid of the sand, and the same operation of rubbing two together is continued with powdered pumice-stone and water. When perfectly smooth, they are again washed, and afterwards separately polished with a large piece of fine pumice-stone, or Water of Ayr stone. The polish now given to the stone should be such as to show the reflection of objects to the eye placed close to the stone, and looking along it towards the light.

When a writing or drawing has been fully used, and the

stone is to be again prepared, sand is strewed over the surface, and it is sprinkled with water, and rubbed with another stone, as before described, till all traces of the drawing have disappeared. After this, the stone is again prepared for a new drawing with fine sand, by being grained or polished, as before.

Ink-drawings sink deeper into the stone than the chalk, and require the stone to be more ground away to efface them. The longer drawings remain upon the stone, the deeper the ink or the chalk penetrates.

2. *Lithographic Ink and Chalk.*

For these materials, the union of several qualities is required; and as no single substance possesses them all, it is necessary to combine several substances together.

Lithographic Ink.

The qualities required in lithographic ink, by which is meant the ink for drawing on stone, are, first, that it shall have in its composition such a quantity of greasy or fatty matter as will secure its imparting to the stone, even when it is laid on in the most delicate lines, a trace strong enough to attract readily the ink afterwards to be applied by the roller; and, secondly, that this grease be so prepared, by being mixed with alkali and other substances, as to be easily soluble in water, and to flow readily from the pen or brush when used for drawing. Many receipts have been given for this purpose, but the following is one of the most approved; and, ordinary care being taken in its preparation, it will be found to answer.

Composition of Lithographic Ink for drawing on Stone.

Tallow candle.....2 oz.
Virgin wax.....2 oz.
Shell lac.....2 oz.
Common soap.....2 oz.
Lamp black, about one twentieth of the whole.

These materials are prepared in an iron saucepan, with a cover. The wax and tallow are first put in and heated till they ignite; whilst they are burning, the soap must be thrown in in small pieces, one at a time, taking care that the first is melted before a second is put in. When all the soap is melted, the ingredients are allowed to continue burning till they are reduced one third in volume. The shell lac is now added, and as soon as it is melted, the flame must be extinguished. It is often necessary, in the course of the operation, to extinguish the flame, and take the saucepan from the fire, to prevent the contents from boiling over; but if, after the process above described, any parts are not completely melted, they must be dissolved over the fire without being again ignited.

Sometimes a larger proportion of wax is used, when only half of the soap is put in, and the burning goes on until the quantity is reduced one half. The remainder of the soap is then added over a fire which keeps the mass melted without igniting it.

The black, being previously mixed with thick varnish, such as will be described when we come to treat of printing inks, should now be added; and when it is completely dissolved, the whole mass should be cast on a marble slab, and a heavy weight laid over it, to render its texture fine. When cold, though not so hard, it should in its fracture have an appearance resembling Indian ink.

So much here depends upon the manipulation, that even the most experienced person can never be sure that the desired result is altogether attained, until the product is subjected to experiments; the mass may have been burned a little more or a little less than enough; too much or too little time may have been allowed to elapse betwixt the putting in of one ingredient and another: such circumstances, trifling as they appear, are quite sufficient to render the ink altogether unfit for use. It not unfrequently happens, therefore, that such faults as the following are to be found: If it has been too little burned, it may appear soft, and, if soluble, it may, when mixed with water, speedily become thick and slimy, in which case it must be re-melted and burned a little more; but if, on the other hand, it has been burned too much, it may appear to be composed of sand, and when used, although it will flow pleasantly enough, may not have enough of grease left in it to attract the printing ink when applied. This fault may be corrected by remelting it, and adding a small quantity of soap and wax.

Keeping in view the principles here pointed out, any one can, after a few trials, make good lithographic ink.

Ink for Transfers.

This ink may be composed of the same materials as the ink for drawing on stone, with the addition of a little more wax. If it is too little burned, the lines of the writing or drawing will spread on being transferred to the stone; if too much, a sufficient quantity of grease will not be imparted to the stone to attract the ink from the roller when it is applied: but either of these defects may be corrected as before directed.

Lithographic Chalk.

This should have the qualities of a good drawing crayon; it should be even in texture, and carry a good point. It is, however, difficult to avoid making it too soft and greasy on the one hand, and too brittle on the other. For the chalk, as for the ink, more or less of the soap, wax, and tallow may be used, as the extent of the burning may render necessary; and the remedies pointed out for defects of the ink will enable the operator to judge of what is wanting.

The following proportions are the best.

Common soap	1½ oz.
Tallow	2 oz.
Virgin wax	2½ oz.
Shell lac	1 oz.

The manipulation is similar to that for the ink. It is well, however, to throw in a little of the wax just before the flame is extinguished. Less black must be mixed with the chalk than with the ink, its only use being to colour the drawing, so that the artist may see the lines he traces.

When the whole is well mixed, it should be poured into a mould, and very strongly pressed to prevent any bubbles, which would make the texture irregular.

3. *Mode of Drawing.*

With these materials the artist proceeds to work on the prepared stone, taking care first to wipe the stone with a clean dry cloth. The ink being rubbed with warm water like Indian ink, is used on the *polished* stone; and it is to be observed, that a gradation of tints can be obtained only by varying the thickness of the lines, and the distance at

which they are placed apart, as the line traced by the ink, being sound and unbroken throughout, receives the printing ink all over. Hence it follows, that the artist cannot gain any advantage by diluting the ink for the lighter tints of the drawing, as the printing ink will take effect equally upon all the lines, and at once render all of them equally black. The object of the artist is to mix the ink to that consistency which, whilst it works freely, shall yet be strong enough to stand perfect through the process of printing. A consistency a little stronger than writing ink is sufficient for this purpose.

The chalk cannot be used upon the polished stone.

The *grained* stone, prepared for chalk, being carefully wiped to free it from dust, must be drawn upon with the crayon as common drawing chalk is used on paper. The subject may be traced on the stone with lead pencil or red chalk, but care should be taken to do this very lightly, so as not to fill up any of the grain of the stone. In drawing, the degree of pressure of the hand will vary the strength of the tint, and it is desirable to give the requisite strength at once, as the surface of the stone is a little altered by receiving the chalk, and hence it does not take any additional lines with the same equality. Practice is necessary to give a command of the material, as it does not work quite like the common crayon, there being great difficulty in keeping a good point. There is also much difficulty in obtaining the finer tints found in the impression; and for the light tints it is necessary to put the chalk in a reed, as the metal port-crayon is too heavy to draw them, even without any pressure from the hand; and therefore the artist cannot draw them with freedom, as his touch will be unsteady, by being obliged to support the pencil from the stone.

It is necessary to observe the grain with which the stone is prepared, which should vary with the fineness of the drawing. Several pieces of chalk should be prepared to use in succession, as the warmth of the hand softens it.

It is useful to cut the chalk in the form of a wedge rather than a point, as it is less likely to bend in that form.

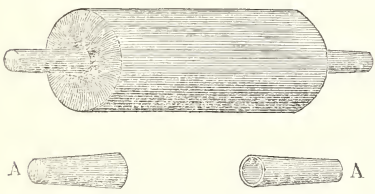
Small portions of the point will break off during the drawing; and these must be carefully removed with a small brush.

4. *Printing Press and Roller.*

The printing press for lithography does not differ materially from the ordinary copperplate press, of which a detailed description of one of the most approved construction is given under the head Copperplate Printing.

The Roller.

The following is a representation of the roller.



The length may vary, but it ought to be full four inches in diameter. It is covered with flannel, rolled tightly three or four times round, and nailed at the ends. It is then covered with a stretched calf-skin, fitting quite tight. The seam must be made neatly with the boot-maker's closing stitch. The ends of the leather are gathered with a string, and tied round the projecting ends of the roller. Loose handles, A, A, made of thick leather, are put on these ends when it is used. The

leather must be put on the roller with the smooth side outwards.

5. *Printing Ink.*

The printing ink is composed, as other printing inks are, of oil, varnish, and very fine lamp-black, well mixed together. To prepare the varnish, a saucepan is about half filled with pure linseed oil, and heated over a fire till it ignites from the flame of a piece of burning paper. It should then be allowed to burn till it be reduced to the degree required; and if, during the operation, there appear danger of its boiling over, it should be immediately taken off the fire, and the cover, which ought to fit quite close on the saucepan, must be put on to extinguish the flame. This is to prevent accidents; and the operator cannot be sufficiently cautioned against the danger attending the burning of the varnish, which ought never to be performed in a room with a boarded floor, or indeed in any part of a house. Wet sacks are the best things to put out the flame in case of accident.

Several inks must be prepared, differing in the degree of viscidity or thickness of the varnish from which they are made, and the quantity of black mixed with them. The longer the oil is burned, the thicker the varnish becomes. The thinnest varnish is burned till it has lost nearly one fourth of its volume, the next till it is reduced one third, the thickest till it is reduced one half.

These directions are to be considered as very general ones; and the state of the varnish is best judged of during the burning, by taking out some with a spoon, and letting a drop fall on a cold earthenware plate, and trying

its degree of viscidity with the finger. The thinnest sort should be like common honey, and the other should draw out in strings, which will be longer as the varnish is thicker. The thickest will draw out in strings two or three feet in length.

It is quite essential to have the oil pure, and the saucepan perfectly clean, and to keep the varnish in clean close jars in a cool place. It is best not to make the varnish long before it is wanted; for if any decomposition takes place in it, the drawing will be spoiled by the printing ink. The black is mixed with the varnish on a grinding-stone with a muller, in small successive quantities; care being taken that the first portion of black is equally mixed with the varnish before a second is added. In the thickest inks this requires considerable labour. By mixing the varnishes together, any degree of stiffness of the ink may be obtained; and by putting more or less black, its thickness is regulated. The printer must always have by him several small pots, each containing a different printing ink, to be used as occasion requires. A small quantity, not more than the size of a hazel-nut, should be used at a time; for it is desirable to charge the roller with as small a quantity as possible. It must be worked well on the colour table with the roller in all directions, that it may be equally distributed all over the roller. Ink-drawings are generally printed with a stiffer ink than chalk-drawings.

6. *Preparation of the Stone for Printing.*

The drawing being finished on the stone as before described, is sent to the lithographic printer, on whose knowledge of his art the success of the impressions in a great

measure depends. The first process is to etch the drawing, as it is called. This is done by placing the stone obliquely on one edge over a trough, and pouring over it nitric acid very much diluted. It is poured on the upper part of the stone, and runs down all over the surface. The stone is then turned, and placed on the opposite edge, and the etching water, being collected from the trough, is again poured over it in the same manner. The degree of strength, which is little more than one per cent. of acid, should be such as to produce a very slight effervescence after the etching water has lain on the stone for a second or two; its strength must vary according to the heat of the atmosphere and the degree of fineness of the drawing. It is desirable to pass the etching water two or three times over the darkest parts of the drawing, as they require more etching than the lighter tints; and when the drawing is fine, a little green should be mixed with it. Some stones, also, and different chalks, require different degrees of strength of the acid; and experience alone can guide the lithographer in his practice on this point. Chalk-drawings require weaker acid than the ink.

The stone is now carefully washed, by pouring clean rain-water over it, and afterwards with gum-water; and when not too wet, the roller, charged with printing ink, is rolled over it in both directions, viz. sideways, and from top to bottom, till the drawing takes the ink. It is then well covered over with a solution of gum-arabic in water, of about the consistency of oil. This is allowed to dry, and preserves the drawing from any alteration, as the lines cannot spread, in consequence of the pores of the stone being filled with the gum. After the etching, it is desirable to leave the stone for a day, and best not to leave it more than

a week, before it is printed from. In some establishments a few proofs are taken immediately after the drawing is etched, but it is better not to do so.

The operation of the etching requires great nicety, and must be done quickly. If the drawing is etched too strongly, the fine tints disappear; if too weak, the printing ink mixes with the darker parts, and the drawing runs into blots. A soft stone requires weaker acid than a hard one, if they are equally pure in quality. The differences in the composition of the stones also require differences in the strength of the etching water, so that no strict or certain rules can be given.

The effect of the etching is, first, to take away the alkali mixed with the drawing chalk or ink, which would make the drawing liable to be affected by the water; and, secondly, to make the stone refuse more decidedly to take any grease. The gum assists in this latter purpose, and is quite essential to the perfect preparation of the surface of the stone.

7. *Printing.*

When the stone is to be printed from, it is placed on the bed or platten of the press; at this time a proper sized scraper for the printing is very carefully adjusted to the surface of the stone. The gum on the stone is now sprinkled with rain-water, and being gradually dissolved, and a wet sponge passed lightly all over it, the printer works the ink which is on the colour table placed beside him, with the roller, in all directions, till it is equally and thinly spread all over the roller. He then, the stone being wet, passes the roller all over the stone in both directions,

observing, as his experience enables him to do, that all parts of the drawing take the ink in due proportion. The roller should be applied with an equal motion and pressure, which must be regulated according to the mode in which the drawing takes the ink; if it does not take it readily, the pressure must be increased, and the roller moved more slowly. The roller should turn freely as it passes over the stone; if it slips, the cause is either that the stone is too wet, or that too much of the gum remains upon the stone; in the first case, a drier sponge will correct the evil; in the second, the stone must be again washed with a little water; but this must be done with caution, as the gum should not be entirely washed off the stone.

At first the drawing receives the ink with some difficulty, and it is frequently necessary to wet the stone and roll it in several times, before it will take the ink readily. Care must now be taken not to wet the stone too much; the less dampness the better, provided it is sufficient to keep the stone from taking the ink in the parts where there is no drawing; at all events, no drops of water should be seen upon the stone, as they spoil the printing ink, and also are imbibed by the roller, which therefore becomes unfit for use. After the drawing is thus rolled in, the sheet of paper is placed on the stone, and the impression taken in the manner described in the account of the press. When, after the impression, the paper is taken up, the stone appears dry, the moisture having been imbibed by the paper. It must be again wetted with a damp sponge, and rolled in with ink as before, taking care to work the roller well on the colour table each time before applying it to the stone.

Generally the first few impressions are imperfect, from

the drawing not taking the ink fully; but this is gradually corrected in the succeeding impressions.

During the printing, some gum must always remain on the stone, though it will not be visible, otherwise the ink will take on the stone, and also spoil the drawing. If, by too much wetting, or by rubbing too hard with the sponge, the gum is entirely removed, some fresh gum-water must be laid on. If the stone has, in the first instance, been laid by with too small a quantity of gum, and the ink stains the stone on being first applied to it, gum-water must then be used to damp the stone instead of pure water. Sometimes, however, this may arise from the printing ink being too thin, as will appear below. If some spots on the stone take the printing ink, notwithstanding the above precautions, some strong acid must be applied to them with a brush; and after this is washed off, a little gum-water is dropped on the place. A steel point is here frequently necessary to take off the spots of ink. The edges of the stone are very apt to soil, and generally require to be wiped with an old sponge or rag after the rolling in. They must also frequently have an application of acid and gum, and sometimes be rubbed with pumice-stone. Chalk-drawings are much the most difficult to print. After this general description of the printing, the following development of the principles on which it is regulated, and notice of the difficulties which arise in its progress, will be found useful. *An ink which is too thin*, and formed of a varnish not sufficiently burned, will soil the stone, notwithstanding that the proper precautions are taken of wetting the stone, and preparing it properly with acid and gum. *Ink which is too stiff* will tear up the lighter tints of the chalk from the stone, and thus destroy the drawing.

The consideration of these circumstances leads us at once to the principles of the printing. These accidents arise at the extreme points of the scale at which the printing inks can be used; for it is evident, that the only inks which can be employed are those which are between these points, that is, thicker than that which soils the stone, and at the same time thinner than that which takes up the drawing. Any increase of temperature will diminish the consistency of the printing ink; the stone will therefore soil with an ink which could be safely used at a lower temperature; hence a stiffer ink must be used. Now, if the temperature should increase so much that the stone will soil with any ink at all less thick than that which will take up the drawing, it is evident that the printing must cease till, by standing, the lines of the drawing shall have acquired additional strength. This, though it sometimes occurs, is a rare case; but it shows that it is desirable to draw with a chalk or ink of less fatness in summer than in winter; and also, that if the printing-room is in winter artificially heated, pains should be taken to regulate the heat as equally as possible.

We will now enumerate some other difficulties which are not referable to the above general principle.

If the pressure of the scraper is too weak, the ink will not be given off to the paper in the impression, although the drawing has been properly charged with it. Defects will also appear from the scraper being notched, or not correctly adjusted, or from any unevenness in the leather or paper.

Inequalities in the roller will cause the drawing to receive the ink unequally, and if the roller or its leather is too hard, it will not ink the drawing clearly.

After printing a considerable number of impressions, it sometimes happens that the drawing takes the ink in dark spots in different parts. This arises from the printing ink becoming too strongly united with the chalk or ink of the drawing, and if the printing is continued the drawing will be spoiled. A little consideration will show us the reason of this accident. The printing ink readily unites with the drawing, and being of a thinner consistency, it will by repeated applications accumulate on the lines of the drawing, soften them, and make them spread. In this case it is necessary to stop the printing, and let the stone rest for a day or two, for the drawing to recover its proper degree of hardness. If the drawing should run smutty, from any of the causes before enumerated, the following mixture will clean it.

Take equal parts of water, spirits of turpentine, and oil of olives, and shake them well together in a glass phial, until the mixture froths; wet the stone, and throw this froth upon it, and rub it gently with a sponge. The printing ink will be dissolved, and the whole drawing also will disappear, though, on a close examination, it can be distinguished in faint white lines. On rolling in again with printing ink, the drawing will gradually re-appear as clear as at first.

Accidents sometimes occur in the printing, from the qualities of the paper. If the paper has been made from rags which have been bleached with oxymuriatic acid, the drawing will be incurably spoiled after thirty impressions. Chinese paper has sometimes a strong taste of alum; this is so fatal as sometimes to spoil the drawing after the first impression.

When the stone is to be laid by after printing, in order

that it may be used again at a future period, the drawing must be rolled in with a *preserving ink*, called by Senefelder, *aetzfarbe*, as the printing inks would, when dry, become so hard that the drawing would not take fresh printing ink freely. The following is the composition of the preserving ink.

Thick varnish of linseed oil.....2 parts.
Tallow.....4 do.
Venetian turpentine.....1 do.
Wax.....1 do.

These must be melted together, and then four parts of lamp-black very carefully and gradually mixed with it, and it must be preserved for use in a close tin box.

Very fine effects are produced in lithographic prints, by printing from two or more stones with different coloured inks. This is managed by preparing a composition of

Wax.....2 parts.
Soap.....1 do.
A little vermilion.

Melt them in a saucepan, and cast them into sticks. This must be rubbed up with a little water to the thickness of cream, and then applied to the surface of a polished stone. An impression is taken in the common way from a drawing, and applied to a stone prepared in this manner, and passed through the press, care being taken to mark, by means of this impression, two points in the margin corresponding on each of the stones. The artist having thus on the second stone an impression from the first drawing to guide him, scrapes away the parts which he wishes to remain white in the finished impression. The stone must now be etched with acid stronger than the common etch-

ing water, having one part of acid to twenty of water. The whole is then washed off with turpentine.

This plan has been very much followed at Munich, and in this country some splendid specimens have lately been produced. It is generally used to print a middle tint from the second stone. The black impression being given from the first stone, a flat transparent brownish tint is given from the second, and the white lights are where the paper is left untouched. The dots are necessary to regulate the placing of the paper on the corresponding parts of the two stones.

The coloured inks for the tints are differently made, according to the tint required, but the varnishes alone make very good light browns.

The paper for lithographic printing should not be so damp as for copperplate printing.

8. *Different manners of Lithography.*

Besides the manners already described of drawing with ink and chalk, lithography is practised in various other ways.

Transfers.

The most useful of these is the transfer before alluded to in speaking of the inks, as it saves the labour and inconvenience of writing backwards. This is performed by writing with the composition ink on a prepared paper, and then transferring the writing to a stone, by passing it through the press.

Dissolve in some water half an ounce of gum-tragacanth,

to which, after it is well mixed and strained, add one ounce of glue and half an ounce of gamboge.

Then take of French chalk.....4 ounces,
old plaster of Paris.. $\frac{1}{2}$ ditto,
starch.....1 ditto.

Powder these, and sift them through a fine sieve ; grind them with a portion of the gum-tragacanth, glue, and gamboge ; then add sufficient water to give it the consistency of oil, and apply it with a brush to thin sized paper. The writing must be made with the ink on the prepared side.

When the transfer is to be made, a polished stone is warmed to about 130° Fahrenheit, and placed in the press. The paper is then carefully damped at the back with a sponge, and placed between some sheets of soft paper. It is next placed on the stone with the writing towards it, and passed through the press as in printing an impression. This must be repeated four or five times without raising the leather cover of the bed of the press, beginning with a slight pressure at first, and increasing it every time. The press is now to be opened, and the paper, being damped, taken off, when the writing will appear to have come off the paper on the stone.

When the stone is quite cold, it is etched and prepared for printing in the usual manner.

This mode is peculiarly valuable for maps, plans, writings, &c. when expedition and economy are objects of importance ; and the impressions produced by skilful lithographers retain all the purity and sharpness of the original drawing or writing.

Imitation of Wood Cuts.

This is a very easy mode, though not much practised. A polished stone is covered all over with lithographic ink, and the parts which are to be left white are scraped away with a steel point. Very fine lines are most easily obtained by putting them in with a hair pencil. The stone is etched as before described.

Etchings on Stone.

A polished stone is prepared for this mode by washing it with diluted acid as weak as the water used for etching a drawing; and after that is washed off, and the stone is dry, it is to be covered with weak gum-water and a little lamp-black. This forms a coating to the stone, and the artist works on it with an etching needle, as in etching upon copper. The lines which he traces appear white, but look stronger than they will appear afterwards. The stone should be a little warmed, for the needle to work freely through the coating, and care must be taken not to breathe upon it. When the etching is finished, the surface is to be rubbed all over with linseed oil, which penetrates into the lines drawn by the needle. After this the coating is to be all washed off with water.

In this mode lines can be drawn as fine as on copper-plate; it is however but little practised in England, though it is often employed in Germany.

The great distinction between lithography and engraving, when employed for works of art, is, that the former gives a fac-simile of an original drawing, which retains all

the freedom and touch of the artist's own hand; whilst, on the contrary, an engraving must be a copy. This character in a lithographic print arises from the facility with which the drawing is produced, as the process is exactly that which the artist would follow in making a common drawing: and the further advantage of a great saving of expense is derived from the same cause; for the drawing being made at once on the stone, the whole expense of the engraving is saved. This is particularly the case with drawings in chalk, or with outlines or slight works in ink; and thus the door is opened to the production of many works which could not otherwise be published on account of the expense of engraving.

The more finished drawings in ink, however, have not the same advantages, for the gradations in tint can be obtained only by the variations in the breadth and distance of the lines, which is the same principle as that on which the engraver works; and hence the labour is more nearly equal in the two methods.

There is, however, much less difficulty in drawing lines on the stone than in cutting them on copper, and of course the operation is less expensive; and the cost of printing from stone is also considerably under that of printing from plates, which renders the employment of lithography doubly advantageous when a large number of copies are required. The number of impressions that may be taken from a chalk drawing varies according to the fineness of the tints and the manner in which the drawing has been executed. Some drawings will be exhausted by 1500 or 2000 copies, others have stood 20,000, and some even 30,000 impressions.

Ink drawings and writings give considerably more; the finest, if properly managed, will give from 6000 to 10,000;

others it seems to be impossible to exhaust, hundreds of thousands having been printed from some without any material injury.

The advances which lithography has made within these few years have been really immense. Specimens in the chalk manner have been produced which vie in beauty with the stippled engravings in the line manner. Efforts equally wonderful have been made, and there seems no reason to doubt that further improvements will yet be effected in this infant art. The external delicacy of tint of the finest engravings, there is reason to believe, as has already been shown, it never can equal; and it is more than probable that the station which it has already attained is that which it is destined to fill; that is, betwixt the first class of engravings and the middling productions of copper and steel, its greatest advantages being economy and expedition in the execution. The innumerable instances in which the public have already been presented with valuable works by means of lithography, which could not have been produced by the more expensive and tedious mode of engraving, are sufficient evidences of its vast importance, and afford ground for the anticipation of still greater benefits.

TYPE-FOUNDING.

In the treatise on Printing the reader will find that the invention of the art of type-founding was a very early consequence of the discovery of the rude art of taking impressions from laboriously excised letters of wood and metal; and that after an investigation of the statements of various authors, the honour of the invention has been given to the illustrious partnership of Gutenberg, Fust, and Schœffer, the larger share being allowed to the latter, as having had practice in the design and proportioning of letters in his original employment of an illuminator; that the place of the invention was the city of Mentz, and that the time was about the year 1457. Nor, upon examination, will it appear that any other can dispute the honour with these worthies, inasmuch as they indisputably used cast metal types before the secession of Gutenberg from his associates, and consequently before the dispersion of their workmen by the capture of Mentz in the year 1462; nor will the claims of Koster of Haarlem in any case interfere with these, the most sanguine of his supporters carrying his pretensions no farther than the art of taking impressions from excised characters of wood, of lead, and lastly of tin. The necessity of some

improvement upon the original method of forming types, even on the very limited scale upon which the first efforts of typography were conducted, must be obvious, and it appears to have advanced in a natural and rapid course. The first step seems to have been the striking of a letter of approved cut, answering in some degree to the modern punch, into soft clay or plaster, and the infusion of metal into the mould thus formed; the shaft or *body*, which by so rude and uncertain a method must necessarily have been rough and untrue, being dressed into correctness by manual labour. The art of casting and working metals, however, being at that time by no means defective, and Fust being by profession a worker in gold and silver, it is probable that a process not unlike the modern was soon invented; but of this we have no certain evidence, the whole art of printing being carefully kept a "mystery" by the initiated until about half a century after the probable date of the invention.[1] This evidence is afforded us by the device of Badius Ascensius, an eminent printer of Paris and Lyon in the beginning of the sixteenth century, and also by that of an English printer, Anthony Scoloker of Ippeswych, who modified and adopted the device of Ascensius, as indeed did many other printers of various countries. This curious design exhibits in one apartment the various processes of printing, the foreground presenting a press in full work,

[1] A copy of the *Speculum Humanæ Salvationis*, in the library of the late duke of Marlborough, presents probably the earliest specimen of cast types; twenty-five of its leaves being printed from solid wooden blocks, or perhaps from wooden blocks on which the designs have been so cut that the scrolls, cut upon other blocks, were inserted in spaces left for them; while, in thirty-eight leaves, the scrolls are in cast type, inserted in the designs in lieu of the engraved scrolls.

the background on the left the cases and the compositor, and on the right the foundery; the matrix and other appliances bearing a precise resemblance to those at present in use. This introduces to observation the fact that the earlier printers generally combined all the various processes of their profession in their own offices, although it would appear, that as the art spread over Europe, and secrecy became less and less necessary, the most enterprising speedily began to furnish their distant brethren with types from their respective founderies. Thus it would appear that the first types of the English architypographer Caxton were supplied by Ulric Zell, and that it was not until the establishment of his printing-house at Westminster that he began to cut letter in imitation of his own hand-writing, and more agreeable to the fashion of writing at that time in use in England. Lettou and Machlinia are supposed to have purchased their types from foreign founderies, perhaps from Lyon or Milan. But Wynkyn de Worde discarded that jealousy which had hitherto obstructed the progress of the art in England, and having cut many founts of considerable beauty, supplied his contemporary typographers. His black letter in especial was so much esteemed as to have been in use to a very late period, and it is said that remnants of his founts are to be found in some of the most ancient printing establishments; nay, it is even possible that some of his original punches or matrices might yet by a diligent antiquary be discovered—a valuable and interesting addition to our many curious relics of the art.

The first record of the separation of the art of type-founding from that of printing, would appear to be a decree of the star-chamber in the reign of Charles I., dated 11th July 1637. This was probably one of the attempts to sup-

press the printing of seditious works by the rising puritans, who, after establishing secret printing-offices in various parts of the kingdom, found it necessary for secrecy to cut their founts themselves. The decree seems to have been in some degree a revival of one of the same nature, 28 Elizabeth, limiting the number of printers to twenty. By the first-mentioned decree it was ordered,

That there shall be four founders of letters for printing, and no more.

That the archbishop of Canterbury, or the bishop of London, with six other high commissioners, shall supply the places of those four as they shall become void.

That no master founder shall keep above two apprentices at one time.

That all journeymen founders be employed by the masters of the trade, and that idle journeymen be compelled to work, upon pain of imprisonment, and such other punishment as the court shall think fit.

That no master founder of letters shall employ any other person in any work belonging to the casting and founding of letters than freemen or apprentices to the trade, save only in pulling off the knots of metal hanging at the end of the letters when they are first cast, in which work every master founder may employ one boy only not bound to the trade.

The four founders appointed by this decree to serve the whole kingdom were John Grismand, Thomas Wright, Arthur Nicholas, and Alexander Fifield.

This decree was revived 14th Charles II., renewed 16th Charles II., and again for seven years 1st James II., at which term it expired, and was never renewed.

The founts in use in English printing-offices may be di-

vided into two kinds; those used for book, and those for job printing, that is, hand and posting bills, &c. Of book types there are twelve regular bodies, viz. Great Primer, English, Pica, Small Pica, Long Primer, Bourgeois, Brevier, Minion, Nonpareil, Ruby, Pearl, and Diamond. Besides these, Minion-Nonpareil is a good deal used; and some founders have introduced intermediate founts, as Emerald.

It is much to be regretted that no uniform standard has been adopted by letter-founders for their founts of the same-named letter; they vary not only from those of other founders, but even from their own, owing to which it seldom happens that any two founts *stand* together. This is the cause of much inconvenience, as in the instance of capitals and small capitals, accented letters, signs, and other sorts introduced into common matter; the printer being obliged to purchase a small quantity of each with every fount, whereas, were there any uniformity, he might have a considerable quantity to be used with any fount as occasion required.

Great Primer (Fr. *Gros Romain;* Ger. *Tertia*) is the largest type in use in book printing, being chiefly for large Bibles, on which account it is sometimes called Bible Text; but it is very seldom employed. There are about 51¼ ms to a foot: it is double the body of Bourgeois.

English (Fr. *Saint Augustin;* Ger. *Mittel*) is much used for church Bibles, and for works in folio and quarto. The French name is probably derived from its being first used to print the works of St Augustin; the German from its being the middle of seven standard founts used by the early German printers. There are about 64 ms to a foot: its body is equal to two Minions.

Pica (Fr. and Ger. *Cicero*, from its having been first used for Cicero's Epistles) is the fount which is used as the general standard of measurement in casting leads, quotations, cutting rule, and regulating the price of press-work, &c. It is in very extensive use for works of a standard character, history, art, and other library works: it is sufficiently large for weak eyes, and not too great for moderately sized 8vo pages, being in fact the just medium. There are 71 ms to a foot, and it is equal to two Nonpareils.

Small Pica (Fr. *Philosophie;* Ger. *Brevier*) is perhaps the most extensively used of all the founts, being a very useful and well-proportioned letter. Novels are almost always printed in this body. 83 ms to a foot; equal to two Rubies.

Long Primer (Fr. *Petit Romain;* Ger. *Corpus*) is likewise much used, being very well adapted for works in 12mo, dictionaries, and other works in which much matter is to be got into a small space: it is the type of the Encyclopædia Britannica, and of this volume. 89 ms to a foot: two Pearls.

Bourgeois (Fr. *Gaillarde;* the Germans have none to correspond) is much used for the same purposes as Long Primer, and in solid matter is difficult to distinguish by the eye from that body. 102 ms to a foot: two Diamonds.

Brevier (Fr. *Petite Texte;* Ger. *Petit* or *Jungfer*) is so called from its having been much used for printing breviaries. It is much employed for small works, and for notes. 112½ ms = 1 foot.

Minion (Fr. *Mignonne;* Ger. *Colonel*) is chiefly in use for newspaper advertisements; it is a very pretty fount, and well adapted for pocket editions, prayer-books, and Bibles: it is perhaps the smallest of readable sizes. 128 ms = 1 foot: half English.

Nonpareil (Fr. and Ger. *Nompareille*), used for the same purposes as Minion. 143 ms = 1 foot: half Pica.

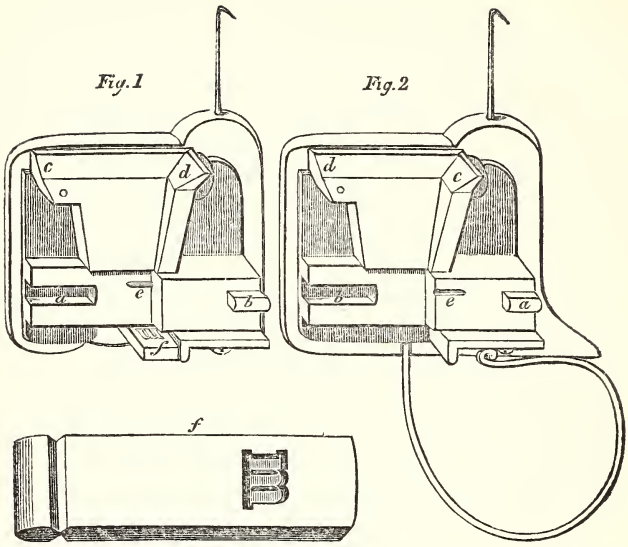
Ruby (no body to correspond in France or Germany), used for pocket dictionaries, prayer-books, &c.; but it is too small for any but the strongest sight. 163 ms = 1 foot: half Small Pica.

Pearl (Fr. *Parisienne;* Ger. *Perl*), used for the same purposes. 178 ms = 1 foot: half Long Primer.

Diamond (Fr. and Ger. *Diamond*) is the smallest body cut; it is distressingly small, and is used mostly for notes to works in Nonpareil and the descending bodies. The French have succeeded in cutting the face so small as to be illegible, and an annual lately sold in London in this letter is accompanied with a magnifying glass. 205 ms = 1 foot: half Bourgeois.

The principal apparatus in the casting of type are the punch, the matrix, and the mould. The punch (or puncheon) is a piece of steel bearing upon one end a single letter, which is formed by hammering, filing, and other processes, and differs in no other respect from ordinary punches than the unusual care and accuracy with which it is worked. It must be remembered, that as each letter is but one of a large number with which it is to harmonize, the height must be obtained with the greatest precision, the breadth both of the heavy and the fine strokes must be carefully proportioned, the turns graceful. This general harmony is not very difficult to attain in the coarser fancy type, there being in this, as in other arts, little merit in imitating the vulgar or the grotesque; but the elegant and symmetrical face of book type is as difficult to attain as the exquisite grace of the higher productions of the arts; and yet, to such perfection have modern artists attained, that the prac-

tised eye has little difficulty in assigning an individual letter to its proper fount, and even, if the printer has turned his attention to the particulars of his art, to the foundery and the artist, the punch-cutter of a foundery of character having a professional reputation, like a painter or engraver. Mr Moxon, a mechanician of great ingenuity, in his Mechanical Exercises, has the credit of first assigning rules for the shaping of letters, laying down geometrical rules for the angles of inclination, the curves, and for adjusting the base from which the shoulders of the letter should rise to obtain the greatest strength. From this the modern artists have varied, obtaining great sharpness of appearance combined with strength and durability. Although beyond a doubt Mr Moxon's formulæ have been of great advantage to subsequent punch-cutters, he was by no means a successful artist himself; his type, cut upon the most philosophical principles, being uglier than that of his contemporaries. The matrix is a small piece of copper into which the punch is struck. Much care is also requisite in doing this, although, provided it be struck sufficiently deep, the surface of the copper may be filed down so as to leave the impress of the exact depth. It has been explained in the treatise on PRINTING, that to obtain equality of impression, the face of the composed type must be in an exact plane, from which it will be easily understood that the just depth of the impression in the matrix is a matter of much importance. The copper must now be carefully dressed at the ends and sides, in order that when adjusted in the mould, the character, when cast, may be so placed upon its body that it shall stand exactly even with its brother characters: the nicety required in this is surprising.



The mould is a very simple but very ingenious apparatus, consisting of two parts, so contrived that, being properly placed together (viz. *a* 2 in *a* 1, *b* 1 in *b* 2, *c* 2 on *c* 1, and *d* 1 on *d* 2), they form, in the centre *e*, a space, which is geometrically described as a parallelopiped, being, in fact, the mould in which the type is formed; the matrix *f* is placed at the bottom; the metal is poured in at the orifice formed by the closing of the upper parts. It will be seen that the two parts which form the mould slide upon each other, and that the extent to which they close is regulated by the width of the matrix; and that therefore all types of one fount, whether the broad 4-m quadrat or the narrow i or l, may be cast in the same mould. The spring at the bottom of figure 2 retains the matrix in its place, and without removing it the new letter cannot be disengaged; the hooks at the top are used to remove the

letter from the mould. *f* is an enlarged drawing of the matrix.

The caster, with this apparatus, stations himself by the side of a furnace containing the melting pot and the fluid metal, of which he takes a portion with a very small ladle, and having poured in a sufficient quantity, jerks the mould into the air with his left hand (a very singular movement), which has the effect of expelling the air and forcing the metal into the finest strokes of the matrix. He then with one finger releases the spring, separates the mould, and hooks out the letter with one of the pieces of bent wire represented at the top of the mould; and so proceeds with considerable rapidity, casting about 500 letters in the hour, of ordinary sized type, although the smaller and the larger sizes require much more time, the first on account of the care requisite, and the latter to allow of the setting of the metal.

The types are now removed from the caster's table by a boy, who strikes off the knob at the bottom, caused by the superfluous metal at the orifice of the mould. A workman next rubs the sides of each letter upon a slab of very gritty stone (his fingers being guarded by a piece of leather), which removes any small knobs or globules attached to the sides or edges. This is done with great rapidity, from 1500 to 2000 letters being rubbed in an hour. The letters are then set up in a long stick, and again dressed, and the bottom grooved, by which exact height is insured; and the fount being then proportioned, is tied up, and is ready for the printer.

The matrix for very large type is differently prepared, the nicety of the punch-cutter's art not being required.

The letter having been accurately shaped out by rule and compass upon a piece of copper or brass, the part so marked out is cut away, care being taken to cut the back somewhat wider than the front, the sloping edge forming the shoulder of the future type. The piece of brass now very much resembles the plates used for stencilling the large headings of legal forms: it is next riveted upon a smooth surface of brass, which forms the face of the letter.

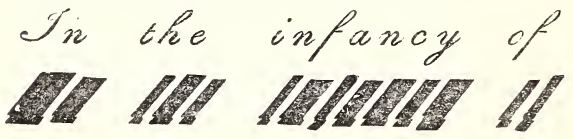
There is a peculiarity in script type which is deserving of mention. Script being an imitation of hand-writing, it is necessary that the fine strokes at the beginning and end of each letter should be in close contact with those of the preceding and succeeding letters. This M. Didot endeavoured to achieve by a very curious shape in the type, by which each should so lock in with the other that the required contact should not fail; but he carried his invention beyond the power of practice, for having resolved the characters into their component parts, he cast a series of signs exactly resembling the "pothooks and hangers" of a schoolboy's copy-book, so that not only was every word to be composed, but every letter:

n m u

The English founders soon improved upon this idea, casting each letter complete. This however requires several letters to be cast in several forms, the initial, medial, and final letters not being always quite alike. The following will give an idea of how script is cast and composed:

In the infancy of the art of Printing.

In the infancy of



Most of the English type-founders, aware of the practical defects of this method, have, by a careful adjustment of the fine strokes at the beginning and end of each letter, cut founts upon the ordinary square body, which answer every purpose. From the nature of the metal, however, and its liability to wear and become battered, script is an expensive fount.

SPECIMEN OF TYPES.

ALTHOUGH in the treatise on TYPE-FOUNDING the names of the different sizes of type used in the printing of books have been given, yet it has been deemed advisable to append here a specimen of the founts which are more commonly in use, with their names affixed, in order that authors may be enabled more readily to point out the type on which they wish any work or part of a work to be printed.

ENGLISH.

" Every printing-house is, by the cus-

PICA.

tom of time out of mind, called a Cha-

PICA.

pel, and all the workmen that belong to it are members of the Chapel; and the oldest freeman

SMALL PICA.

is father of the Chapel. I suppose the style was originally conferred upon it by the courtesie of some

LONG PRIMER.

great church-man, or men (doubtless when chapels were in more veneration than of late years they have been here in

BOURGEOIS.

England) who, for the books of divinity that proceeded from a printing-house, gave it the reverend title of Chapel.

BREVIER.

"There have been formerly customs and bye-laws made and intended for the well and good government of the Chapel, and for the more civil and orderly deportment of all its members

MINION.

while in the Chapel, and the penalty for the breach of any of these laws and customs is in printers' language called a Solace.

"And the judges of these solaces, and other controversies relating

NONPAREIL.

to the Chapel, or any of its members, were, plurality of votes in the Chapel; it being asserted as a maxim, that 'the Chapel cannot err.' But when any controversy is thus decided, it always ends in the good of the Chapel."

THE END.

Fac Simile of the Biblia Pauperum.

Fac-Simile of the Mentz Psalter, A.D. 1457.

Eatus vir qui non
abijt in ſilio impioꝝ
et in via peccatoꝝ non
ſtetit: et in cathedra peſti-
lentie non ſedit. Sed
in lege dñi voluntas

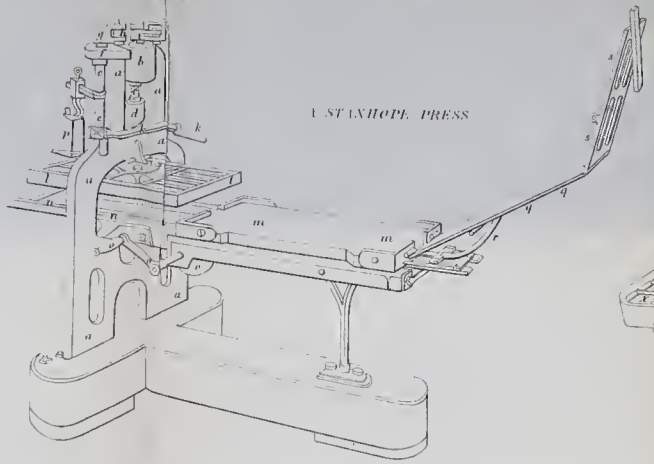
COLOPHONS.

FUST AND SCHŒFFER.

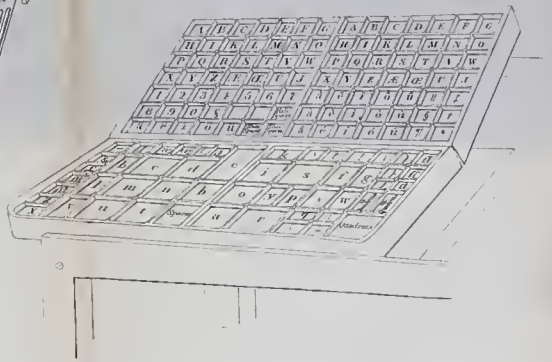
WILLIAM CAXTON.

Composing-stick

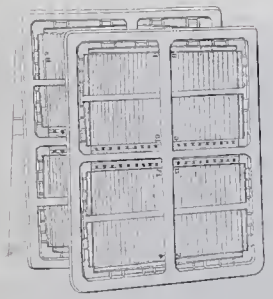
Two forms making one sheet



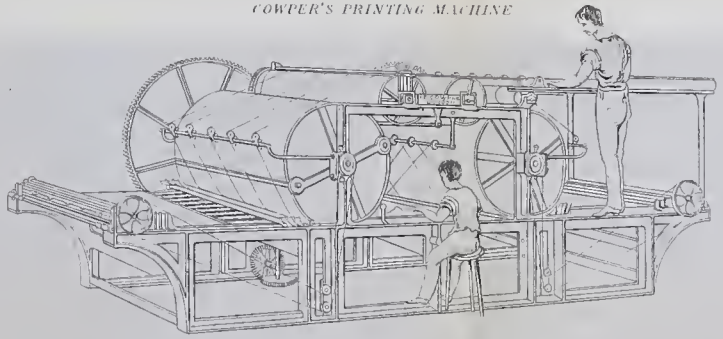
A STANHOPE PRESS



A Pair of Cases



COWPER'S PRINTING MACHINE



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